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RARE BOOK













Panicle narrow, dense. Spikelets sessile and crowded on the short branches. Glumes 3 lines or the flowering rather longer. Awns 4 to 6 lines . . . . . 9. *A. depressa*.

SECTION I. ARTHRATHERUM.—Awn articulate on the glume, although usually remaining attached and falling off with it, entire and twisted below the branches. Flowering glume much shorter than the outer ones.

1. *A. hygrometrica*, *R. Br. Prod.* 174.—A glabrous, slender, rigid but brittle grass, branching at the base, 1 to 2 ft. high. Leaves subulate, rigid, with closely appressed sheaths minutely ciliate at the orifice. Panicle narrow, scarcely branched, 6 to 10 in. long without the awns. Spikelets few, on short erect pedicels. Outer glume obtuse, 8 to 9 lines long, prominently 3-nerved or sometimes 4-nerved by the doubling of the outer one; 2nd glume hard and convolute, nearly  $1\frac{1}{2}$  in. long, acute, 1-nerved; flowering glume narrow, convolute, glabrous, about 3 lines long on a hairy stipes of 1 to  $1\frac{1}{2}$  lines. Awn articulate on the glume, at least 2 in. long below the branches, the middle branch  $2\frac{1}{2}$  to 4 in., the lateral ones as long or shorter. Palea a little more than 1 line long. Lodicules at least as long, finely striate at the base.—Beauv. *Agrost.* t. 8, f. 8; *Trin. and Rupr. Gram. Stip.* 162.

**N. Australia.** Arnhem N. Bay, *R. Brown*; Upper Victoria River, *F. Mueller*.

2. *A. stipoides*, *R. Br. Prod.* 174.—Habit and foliage of *A. hygrometrica* but more slender. Panicle long with a slender rhachis, the lower short erect branches usually bearing 2 spikelets, the upper spikelets singly distant on short erect pedicels. Outer glume 1-nerved, about  $\frac{1}{2}$  in. long, glabrous or minutely pubescent; 2nd rigid, convolute  $\frac{3}{4}$  in.; flowering glume scarcely smaller than in *A. hygrometrica*, but the awn much finer, about  $1\frac{1}{2}$  in. below the branching, the branches  $1\frac{1}{2}$  to 2 in. long.—*Trin. and Rupr. Gram. Stip.* 161; *F. Muell. Fragm.* viii. 111.

**N. Australia.** Islands of the Gulf of Carpentaria, *R. Brown*; Gilbert River, *Sullivan*; Nicholson and Upper Victoria Rivers, *F. Mueller*; Port Darwin, *Schultz*, n. 82; Dampier's Archipelago, *Walcot*.

**Central Australia.** Between Alice Springs and Charlotte Waters, *Giles*; Lake Eyre, *Andrews*.

3. *A. arenaria*, *Gaudich. in Freyc. Voy. Bot.* 407.—Very near *A. stipoides* and reduced to that species by *F. Mueller*, *Fragm.* viii. 111, but a smaller plant, the stems usually not above 6 in. below the inflorescence, rarely slender leafy and nearly 1 ft. long. Leaves much finer, almost filiform. Panicle narrow and spikelike, scarcely branched or more frequently reduced to a simple raceme, 3 to 4 in. long without the awns. Outer glumes very narrow and fine-pointed, usually dark coloured, the lowest nearly  $\frac{1}{2}$  in. long, the 2nd  $\frac{3}{4}$  in.; flowering glume rather smaller than in *A. stipoides*, the awn under 1 in. and usually  $\frac{1}{2}$  to  $\frac{3}{4}$  in. below the branching, the branches very fine, varying

from 1 to 3 in.—Trin. and Rupr. Gram. Stip. 163; *Arthratherum arenarium*, Nees in. Pl. Preiss. ii. 98; *Aristida contorta*, F. Muell. in Trans. Vict. Inst: 1855, 44.

**N. Australia.** Nichol Bay, *Mrs. McCroud*.

**Queensland?** King's Creek, *Bowman*; a single specimen which seems referrible rather to this than to *A. stipoides*.

**N. S. Wales.** From the Lachlan and Darling to the western boundary, *Victorian and other Expeditions*.

**S. Australia.** Cudnaka and Murray Rivers, *F. Mueller*; between Alice Springs and Charlotte Waters, Central Australia, *Giles*.

**W. Australia,** *Drummond*; York district, *Preiss*, n. 1837; Kalgan River, *Oldfield*; Fraser's Range, *Dempster*; Ningham country, *Monger*.

SECTION II. CHÆTARIA.—Awn not articulate, divided to the glume into 3 branches, the glume itself when barren sometimes twisted but not the awn. Flowering glume about as long or longer than the outer ones.

4. **A. Behriana**, *F. Muell. in Trans. Vict. Inst. 1855, 44.*—Stems ascending, usually under 1 ft. below the inflorescence. Leaves subulate at the end, somewhat dilated at the base and the upper sheaths often rather broad and loose. Panicle dense, 2 to 3 in. long and almost as broad, the spikelets nearly sessile. Outer glumes nearly equal, the lowest fine-pointed, the 2nd usually rather longer than the flowering glume. Flowering glume about  $\frac{1}{2}$  in. long; with 3 nearly equal sessile awns fine and above 1 in. sometimes nearly 2 in. long.

**N. S. Wales.** In the western interior, *A. Cunningham*; Bogan River, *Mitchell*; Maranoa, *Woolfs*; on the Macquarie, *C. Moore*; Murrumbidgee, *M'Arthur*.

**S. Australia.** St. Vincent's Gulf to the Murray River and Lake Hindmarsh, *F. Mueller*.

5. **A. leptopoda**, *Benth.*—Stems rather stout, from scarcely 6 in. to 2 ft. high. Leaves long and subulate, with rather broad loose sheaths. Panicle very loose, 6 in. to 1 ft. long, with numerous long rigidly filiform branches at first erect, at length spreading horizontally, bearing few spikelets on filiform pedicels. Outer glumes unequal, with long points, the longest usually about as long as the flowering glume. Flowering glume 6 to 8 lines long, on a very short scarcely ciliate stipes, with 3 nearly equal sessile awns  $\frac{1}{2}$  to 1 in. long. Palea small and rigid.

**Queensland.** Brisbane River, *Bailey*; Darling Downs, *Leichhardt*; Peak Downs, *Burkitt*; Kennedy District, *Daintrie*; Tawomba, *Hartmann*.

**N. S. Wales.** Glendon and Liverpool Plains, *Leichhardt*; Richmond River, *Herb. F. Mueller*.

6. **A. vagans**, *Cav. Ic. v. 45, t. 471.*—Stems slender, erect and 1 to 2 ft. high, or diffuse and much branched. Leaves slender, almost filiform, usually short. Panicle 3 to 6 in. long, at first narrow, at length branching and pyramidal, the pedicels very short. Outer glumes usually dark-coloured, 2 to 3 lines long, the 2nd longer than the lowest,



both with 1 prominent nerve. Flowering glume always longer than the outer ones and often twice as long. Awns sessile, about 4 lines long. Palea very short.—*R. Br. Prod.* 173; *F. Muell. Fragm.* viii. 111; *A. ramosa*, Sieb. *Agrostoth.* n. 55; *A. parviflora*, Steud. *Syn. Glum.* i. 140 (from the char. given).

**Queensland.** Brisbane River, Moreton Bay, *F. Mueller*; Rockhampton, *O'Shanesy*; Condamine, *Hartmann*.

**N. S. Wales.** Port Jackson, *R. Brown*, *Woods*; New England, *C. Stuart*.

Var. *gracillima*. Stems long, slender and branching; panicle filiform.—Cameroons Brush, *Leichhardt*; Rockhampton, *O'Shanesy*.

Var. *compacta*. Panicle short and compact, but the spikelets and awns quite of *A. vagans*.—Warwick, *Beckler*, *Nerst*.

7. *A. ramosa*, *R. Br. Prod.* 173.—Very nearly allied to *A. calycina*, and almost intermediate between that and *A. vagans*. Panicle narrow, with erect or scarcely spreading branches and the outer glumes as long as the flowering ones or nearly so as in *A. calycina*, but the spikelets much smaller, the glumes scarcely above 3 lines and the awns under  $\frac{1}{2}$  in. long.

**Queensland.** Brisbane River, Moreton Bay, *F. Mueller*, *Bailey*; Rockhampton, *O'Shanesy*; Herbert's Creek, *Bourman*; Darling Downs, *Lav*.

**N. S. Wales.** Port Jackson, *R. Brown*; Liverpool Plains, *A. Cunningham*; New England, *C. Stuart*; Clarence River, *Beckler*; also in *Leichhardt's* collection.

Var.  $\frac{1}{2}$  *leptathera*. Panicle spreading, awns 1 in. long, but the spikelets of *A. ramosa*.—Dry-Beef Creek, *Leichhardt*.

Var. *compacta*. Panicle short and dense.—Gracemere, *O'Shanesy*.

8. *A. calycina*, *R. Br. Prod.* 173.—Stems tufted, erect, 1 to 2 ft. high. Leaves very narrow, mostly subulate. Panicle narrow, often above 6 in. long, with few short erect branches, rarely at length spreading, each bearing 1 or 2 or the lower ones several but few sessile or shortly pedicellate spikelets. Spikelets in the typical form 4 to 5 lines long without the awns. Outer glumes with fine points, the 2nd as long as or longer than the flowering glume. Awns slender, sessile,  $\frac{3}{4}$  to 1  $\frac{1}{2}$  in. long. Palea rather long.

**N. Australia.** Upper Victoria River, *F. Mueller*; Port Darwin, *Schultz*, n. 765.

**Queensland.** Keppel Bay, *R. Brown*; Flinders River and Nerakool Creek, *Bourman*; Darling Downs, *Lav*; Peak Downs, *Burkitt*.

**N. S. Wales.** Between the Darling and Cooper's Creek, *Neilson*.

**Central Australia.** Near Alice Springs, *Giles* (with a looser panicle).

9. *A. depressa*, *Retz*; *Kunth, Enum.* i. 190.—A very variable grass, distinguished by its narrow spikelets crowded and almost imbricate along the short erect branches of a narrow compact panicle. Stems in the Australian specimens ascending or erect, above 1 ft. high. Leaves narrow, ending in subulate points. Panicle from 2 or 3 in. long and spikelike, to 6 or 8 in. and interrupted at the base. Spikelets

sessile along the branches and often purplish. Outer glumes about 3 lines long. Flowering glumes usually longer. Awns sessile, varying from 4 to 6 lines or rather more.—*A. vulgaris*, Trin. and Rupr. Gram. Stip. 131.

**Queensland.** Peak Downs, *Burkitt*.

**N. S. Wales.** Hunter's River, *U.S. Exploring Expedition*; also in *Leichhardt's* collection.

Widely spread over tropical and subtropical Asia and Africa and the south Mediterranean region, and probably the same as the tropical American *A. dispersa*, Trin. et Rupr.

#### 49. STIPA, Linn.

Spikelets 1-flowered, on filiform pedicels or nearly sessile in a terminal panicle, the rhachis of the spikelet articulate above the 2 outer glumes. Glumes 3, narrow, 2 outer usually persistent, membranous, keeled, empty, unawned; terminal or flowering glume narrow, rigid, rolled round the flower, with a terminal undivided bent awn spirally twisted below the bend. Palea enclosed in the flowering glume. Lodicules usually large. Anthers usually tipped with a tuft of hairs. Styles distinct. Grain narrow, enclosed in the hard upper glume but free from it.—A short continuation of the rhachis of the spikelet above the articulation forms usually a stipes to the flower and fruit, falls off with it and is usually ciliate with short hairs, the awn is more or less distinctly articulate on the flowering glume, but usually remains attached to it after it falls.

The genus is widely dispersed over the tropical and temperate regions of the New and the Old World. The Australian species, however, belong to the group or section *Nesostipa*, Trin., which is exclusively Australian, one of them only extends to New Zealand, the remaining 14 appear to be all endemic.

Flowering glume glabrous or slightly hairy at the end, very shortly produced into hyaline lobes or entire. Palea very small or rarely half as long as the glume.

Panicle branches long and plumose. Spikelets 4 to 6 lines long . . . . .

Panicle very much branched, glabrous or slightly pubescent. Spikelets scarcely  $1\frac{1}{2}$  lines long, . . .

Flowering glume silky-hairy, the hyaline margins at the end produced into a small lobe on each side of the awn. Palea nearly as long as the glume. Panicle narrow and compact.

Outer glumes acute, under  $\frac{1}{2}$  in., usually yellowish brown. Lobes of the flowering glume very small . . . . .

Outer glumes finely pointed, above  $\frac{1}{2}$  in. long, white and hyaline. Lobes of the flowering glume more conspicuous . . . . .

Flowering glume silky-hairy, the margins not dilated under the awn. Palea nearly as long as the glume.

1. *S. elegantissima*,

2. *S. micrantha*,

3. *S. flavescens*,

4. *S. teretifolia*.







Ligula elongated, not ciliate.

Panicle dense, enclosed at the base in the broad loose upper leaf-sheath. Awn 3 to 5 in. long.

Ligula 2 to 4 lines . . . . . 5. *S. compressa*.

Panicle rather loose, at length very long. Awn about 2 in. Ligula rounded, 1 to 2 lines . .

6. *S. Drummondii*.

Panicle dense and spikelike, 2 to 4 in. long. Awn  $1\frac{1}{2}$  to 2 in. Leaves rather long, subulate . .

7. *S. pycnostachya*.

Panicle loose. Leaves slender, filiform . . . .

8. *S. setacea*.

Ligula short, ciliate. Awn plumose-hairy in the lower part.

Panicle dense, 6 to 10 in. long. Awn  $1\frac{1}{2}$  to 4 in. long, shortly plumose-hairy all round to the bend or higher up . . . . .

9. *S. semibarbata*.

Panicle rather dense, 4 to 5 in. Awn about 1 in., plumose about the middle with long hairs turned to one side . . . . .

10. *S. hemipogon*.

Ligula short, ciliate. Awn glabrous or slightly pubescent.

Lowest glume usually slightly dilated and truncate or toothed at the end. Flowering glume narrow. Panicle dense or at length long and loose . . . . .

11. *S. pubescens*.

Lowest glume usually 3-pointed. Flowering glume rather broad. Panicle very loose . . . .

12. *S. aristiglumis*.

Lowest glume always fine-pointed.

Bulbous base of the stem densely woolly. Leaves long, filiform, flexuose . . . . .

13. *S. eriopus*.

Base of the stem and lower leaf-sheaths smooth and shining. Leaves filiform, hispid with spreading hairs . . . . .

14. *S. trichophylla*.

Leaves slender, glabrous or pubescent, the upper sheaths sometimes dilated. Panicle loose .

15. *S. scabra*.

1. ***S. elegantissima***, *Labill. Pl. Nov. Holl.* i. 23, *t.* 29.—Stems from a horizontal rhizome erect and branching, rigid though rather slender, 2 to 3 ft. high. Leaves narrow, mostly erect, convolute when dry, glabrous. Panicle very loose, 6 to 8 in. long, at length broadly spreading, the rhachis and long filiform branches elegantly plumose with fine spreading hairs. Outer glumes 4 to 6 lines long, equal or the lowest much shorter, acutely acuminate; flowering glume shorter, on a short hairy stipes but glabrous, the involute margins shortly hyaline at the end and produced into a very short obtuse lobe on each side of the awn. Awn 1 to  $1\frac{1}{2}$  in. long or sometimes even longer. Palea less than  $\frac{1}{3}$  as long as the glume.—*R. Br. Prod.* 175; *Hook. f. Fl. Tasm.* ii. 111; *Nees in Pl. Preiss.* ii. 99; *F. Muell. Fragm.* viii. 103.

**N. S. Wales.** From the Lachlan and Darling to the western boundary, *Victorian and other Expeditions*.

**Victoria.** Murray and Wimmera Rivers, *F. Mueller*.

**Tasmania?** *Labillardière*, l. c. *Labillardière's* specimen from Capt. Baudin in herb. R. Brown is, however, marked 'Nouv. Holl. Sud-Ouest,' and the species has appeared in no other Tasmanian collection.

**S. Australia.** From the Murray to St. Vincent's and Spencer's Gulfs, *F. Mueller* and others; between Enola and Fowler's Bay, *Richards*.



**W. Australia.** King George's Sound, *Baxter*; Swan River, *Drummond*, 1st coll., also n. 139, 958, 965; Carnac Island, *Preiss*, n. 1847; Murchison River, *Oldfield*.

2. ***S. micrantha***, *Cav.*? *R. Br. Prod.* 175.—Stems several feet high, not stout but rigid, sometimes spreading or scrambling with the branches in dense clusters, sometimes long and little-branched. Leaves very slender, the sheaths often long and loose, glabrous. Panicle loose but often narrow, from under 6 in. to above 1 ft. long, with very numerous capillary glabrous branches. Spikelets the smallest in the genus, pedicellate on the ultimate branches. Outer glumes linear, very thin, nearly equal, scarcely  $1\frac{1}{2}$  lines long. Flowering glume shorter, nearly glabrous, on a very short and ciliate stipes, entire at the top, the awn very slender, about  $\frac{1}{2}$  in. long. Palea not above  $\frac{1}{2}$  the length of the glume.—*Sieb. Agrostoth.* n. 82; *S. verticillata*, *Nees* in *Spreng. Syst. Cur. Post.* 30; *Sieb. Agrostoth.* n. 64; *Streptachne verticillata*, *Trin.* and *Rupr. Gram. Stip.* 8; *Stipa ramosissima*, *Nees* in *Sieb. Agrostoth.* n. 82; *Trin.* in *Mem. Acad. Petersb.* ser. 6, i. 74; *F. Muell. Fragm.* viii. 105; *Streptachne ramosissima*, *Trin.* and *Rupr. Gram. Stip.* 7, who refer to it *Urechne ramosissima*, *Trin. Gram. Unifl.* 173, there very insufficiently described.

**Queensland.** Brisbane River, *Bailey*; Dawson River, *F. Mueller*; Darling Downs, *Leichhardt*; Warwick, *Beckler*.

**N. S. Wales.** Port Jackson, *R. Brown*, *Woolfs* and others; Clarence River, *Beckler*, *Wilcox*.

It appears to me probable that *R. Brown* was correct in identifying this plant with the *S. micrantha* described and figured by *Cavanilles* Ic. v. 42, t. 467, although more recent botanists have thought that *Cavanilles'* description agreed better with the *Dichelachne sciurea*; that author, however, adds to his plate a magnified figure of a flowering glume and awn which is wholly inapplicable to the *Dichelachne*, but agrees well with the present species, which is also well represented (in its rather poor state) by *Cavanilles'* general figure. The awn is certainly articulate on the glume, and therefore not that of *Streptachne*.

3. ***S. flavescens***, *Labill. Pl. Nov. Holl.* i. 24, t. 30.—An erect rather slender grass of  $1\frac{1}{2}$  to 3 ft., quite glabrous or the lower leaves slightly pubescent. Lower leaves sometimes flat at the base, but all otherwise convolute when dry, very narrow or almost subulate, often rigid. Ligula very short, not ciliate. Panicle narrow and dense, 6 in. to above 1 ft. long, the erect branches and pedicels glabrous. Outer glumes 4 to 6 lines long, acute. Flowering glume on a rather long hairy stipes, scarcely 3 lines long, silky-hairy, the hyaline involute margins ending in a small very thin lobe or tooth on each side of the awn, often difficult to distinguish from the hairs. Awn usually pubescent,  $1\frac{1}{2}$  in. long or more. Palea nearly as long as the glume, hairy towards the top.—*R. Br. Prod.* 175; *Hook. f. Fl. Tasm.* ii. 110.

**Victoria.** Yarra River, Port Phillip and Wilson's Promontory, *F. Mueller*; French Island, *Beveridge*.

**Tasmania.** *Labillardière*, *Gwen*; Kent's Island, *R. Brown*; King's Island, *Neate*.

**S. Australia.** Adelaide, *Blandowski*; Fowler's Bay, *Richards*.

**W. Australia.** King George's Sound, *R. Brown*; also *Drummond*, 4<sup>th</sup> coll. n. 377.

Preiss's specimens (from Cape Riche? or from Snake River?) n. 1856, referred by Nees in Pl. Preiss. ii. 98 to *S. eriocha*, Gaudich., appear to me to be also the *S. flavescens*, of which they have the typical inflorescence and foliage. I have not seen the true *S. eriocha*, Gaudich. in Freye, Voy. Bot. 407, from Shark's Bay, but from his short character and from Trinius's description it is probably either this or the following species. Both appear to be sea-coast plants nearly allied to each other. Some specimens in herb. Hook. gath. red in Shark's Bay by Milne are also probably one of the two species, but they are old with only the outer glumes persisting and cannot be rightly determined. Sprengel's *S. pulchra*, referred by some to *S. eriocha*, is the Port Jackson *S. pubescens*.

4. ***S. teretifolia***, Steud. *Syn. Glum.* i. 128.—Very closely allied to *S. flavescens*, the stems in dense tufts,  $1\frac{1}{2}$  to above 2 ft. high. Leaves long, slender, terete or acicular, sometimes as long as the stem; ligula broad and membranous, entire, decurrent along the margins of the sheath. Panicle narrow, 4 to 8 in. long, not so dense as in *S. flavescens*. Spikelets larger. Outer glumes pale-coloured or whitish, usually above  $\frac{1}{2}$  in. long, with scarious tips. Flowering glume much shorter, hairy, the upper hairs long and at length spreading, the terminal lobes on each side of the awn more conspicuous than in *S. flavescens*, though often almost concealed by the hairs. Awn rarely above 1 in. long, minutely pubescent.—T. Muell. *Fragm.* viii. 104; *Dichelachne stipoides*, Hook. f. *Fl. N. Zel.* i. 294, t. 66, *Fl. Tasm.* ii. 112; *Dichelachne setacea*, Nees in Pl. Preiss. ii. 98 (excl. syn.).

**Victoria.** Western Port, *D'Urville* (Steudel),

**Tasmania.** George Town, forming large tussocks at high water mark, *Gunn*, *C. Stuart*; South Port, *C. Stuart*; Swan Port, *Storcy*.

**W. Australia.** Preiss's specimens n. 1854 seem to belong rather to this than to the preceding species.

Also in New Zealand. I have seen no authentic specimens of Steudel's plant, but the character given agrees very fairly with our plant.

5. ***S. compressa***, R. Br. *Prod.* 175.—Stems 1 to 2 ft. high but often flowering when under 6 in. Lower leaves with short sheaths and laminae, the upper ones with long loose broad laminae, the upper one embracing the base of the panicle; ligula 2 to 4 lines long, acute or bifid, not ciliate. Panicle at first very dense, narrow, at length looser, above 1 ft. long, with rather long erect filiform branches. Outer glumes often above  $\frac{1}{2}$  in. long, tapering into fine points. Flowering glume shorter, pubescent, entire. Awn glabrous, very fine, 3 to 5 in. long.

**W. Australia.** King George's Sound, *Macrae*; Kalbar River, *F. Mueller*; also *Drummond*.

Var. *tachycarpa*. Lower leaf-sheath villous with almost paleaceous hairs.—*Drummond*, n. 132.

6. ***S. Drummondii***, Steud. *Syn. Glum.* i. 128.—Nearly allied to *S. compressa*, with the same stature and inflorescence. Leaves usually

longer and more rigid, the upper sheath long and broad, embracing the base of the panicle as in *S. compressa*, but the ligula much shorter, broad and rounded and sometimes very short but not ciliate; lower sheaths glabrous or pubescent. Panicle at first dense and short, at length loose and above 1 ft. long. Outer glumes varying in size, but usually smaller than in *S. compressa*. Flowering glume silky-villous. Awn fine, rarely much above 2 in. long.

**W. Australia**, *Drummond*, 4th coll. n. 378. This species resembles also at first sight the var. *pubescens* of *S. setacea*, but differs in the ligula, the denser narrow panicle and shorter awns.

**7. *S. pycnostachya*, Benth.**—Stems tufted, about 1 ft. high, slightly bulbous at the base. Leaves erect, subulate, glabrous or the lower sheaths slightly pubescent, the upper sheath embracing the base of the panicle but not nearly so much as in *S. compressa*; ligula long and membranous. Panicle compound, but dense and spikelike, 2 to 4 in. long, with very short erect branches, the lower spikelets sometimes reduced to empty glumes. Outer glumes narrow, almost hyaline, produced into fine points, the longest rarely  $\frac{1}{2}$  in. long. Flowering glume silky-villous,  $1\frac{1}{2}$  lines long, the inflexed margins slightly dilated at the top. Awn slender, glabrous,  $1\frac{1}{2}$  to 2 in. long. Palea as long as the glume, hairy at the top.

**W. Australia**, *Drummond*, n. 121.

**8. *S. setacea*, R. Br. Prod. 174.**—Stems slender, 1 to 2 ft. high or rarely more. Leaves fine and short, tufted at the base of the stem, those on the stem few with long sheaths; ligula elongated, not ciliate, often broken off from dried specimens. Panicle loose, 4 to 10 in. long, glabrous. Outer glumes very thin, narrow, acuminate, 4 to 5 lines long. Flowering glume much shorter, pubescent or villous, entire at the top. Awn glabrous, very fine,  $1\frac{1}{2}$  to above 2 in. long. Palea as long as the glume, often hardened when ripe.—Hook. f. Fl. Tasm. ii. 110, t. 157.

**Queensland**, Warwick, *Beckler*.

**N. S. Wales**. Port Jackson, *R. Brown*; Castleragh, *Woolfs*; New England. *C. Stuart*, also in *Leichhardt's* collection; on the Lachlan and Darling, *Burkitt*; Murrumbidgee, *M'Arthur*; Edwards River, *F. Mueller*.

**Victoria**. Wendu Vale in large patches, *Roberts*; Portland, *Allitt*; Mount M'Ivor, *Bladowski*.

**Tasmania**. Launceston, *Gunn*.

**W. Australia**. Blackwood River, *Oldfield*; Champion Bay, *C. Gray*; also apparently *Drummond's* n. 136 (or 961?), though the ligula is shorter and jagged.

Var. ? *latifolia*. Taller and stouter, leaves broader, the lower sheaths villous. Panicle dense. Awns very long and fine.—*S. scelerata*, *Behr. Herb.*

**S. Australia**. Augusta, *Behr*; Crystal Brook, *F. Mueller*; Murray River, *Bladowski*.

**9. *S. semibarbata*, R. Br. Prod. 174.**—Stems  $1\frac{1}{2}$  to near 3 ft. high.



Leaves narrow, convolute, often almost subulate, glabrous or shortly pubescent, the ligula very short and ciliate. Panicle oblong, rather dense, 6 to 10 in. long, with erect branches. Outer glumes 6 to 9 lines long, tapering into very thin long acute points. Flowering glume silky-hairy, scarcely 3 lines long, entire at the top. Awn varying from under 2 in. to near 4 in. long, shortly plumose-hairy to the bend or sometimes nearly to the end.—Hook. f. Fl. Tasm. ii. 110; F. Muell. Fragm. viii. 104.

**N. S. Wales.** Mudgee, *Woolfs*; Berrima, *Mrs. Calvert*.

**Victoria.** Yarra River, *F. Mueller*, *Harvey*; Mount M'Ivor, *C. Stuart*; French Island, *Beveridge*.

**Tasmania.** Port Dalrymple, *R. Brown*; abundant in dry soil throughout the island, *J. D. Hooker*.

**S. Australia.** Rivoli Bay, *F. Mueller*.

**W. Australia.** King George's Sound and Kalgan River, *Olfield*; Swan River, *Drummond*, 1st coll., also n. 116 and 129.

Var. *camptolochne*. Awns rather less plumose, with shorter hairs.—*S. camptolochne*. Nees in Pl. Preiss. ii. 99.—Swan River, *Drummond*, 1st coll., *Preiss*, n. 1848.

I have seen two specimens of *Preiss*'s n. 1848, in one the awns are as plumose as in the common *S. semibarbata*, in the other the hairs are much shorter, showing an approach to *S. pubescens*. A specimen of *Drummond*'s in herb. Lindley named by Nees *S. camptolochne* has the awns quite glabrous and may be *S. scabra*, but it is in a very imperfect state.

Var. *mollis*. A coarser grass of 2 to 3 ft., the foliage usually softly pubescent, the other characters the same.—*S. mollis*. R. Br. Prod. 174.—Port Jackson, *R. Brown*; Wimmera, *Mrs. Wilson*. Sieber's specimens, *Agrostoth.* n. 60, probably from Port Jackson, are between the common form and the var. *mollis*.

10. **S. hemipogon**, *Benth.*—A rather slender grass of  $1\frac{1}{2}$  to 2 ft. Leaves long, erect, very narrow and convolute, loosely pubescent or at length glabrous, the ligula very short, ciliate. Panicle narrow, rather dense, 4 to 5 in. long, with short erect branches. Outer glumes about 6 lines long, very thin, hyaline, narrow, with long fine points. Flowering glume much shorter, silky-hairy, on a rather long stipes. Awn about 1 in. long, bearded far above the bend, the hairs about the middle long, spreading, all turned to one side. Stamens 3 but often only 1 with a full-grown anther. Palea nearly as long as the glume.

**W. Australia**, *Drummond*, n. 231, 376. Referred by F. Muell. Fragm. viii. 104 to a variety of *S. semibarbata*.

11. **S. pubescens**, *R. Br. Prod.* 174.—Stems 2 to 3 ft. high, with pubescent nodes. Leaves narrow, convolute, the ligula very short, usually ciliate. Panicle rather loose in the typical form, very loose in some varieties. Outer glumes unequal, the longest about  $\frac{1}{2}$  in., scarious at the end and often but not always truncate, notched or 3-toothed, rarely very acute. Flowering glume much shorter, hairy, entire at the top. Awn above 2 in. long, pubescent in the lower part or glabrous. Palea rather long.—Sieb. *Agrostoth.* n. 59, 66; Hook. f. Fl. Tasm. ii.

110; F. Muell. Fragm. viii. 104; *S. rudis*, Spreng. Syst. Cur. Post. 31; *S. commutata*, Trin. and Rupr. Gram. Stip. 49.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *Woolfs* and many others; New England, *C. Stuart*.

**Victoria.** Latrobe River, *F. Mueller*.

**Tasmania.** Swanport, *Story*; common in dry soils, *J. D. Hooker*.

**S. Australia.** Cudnaka and Mount Remarkable, *F. Mueller*.

Var. ? *effusa*. Panicle very loose and rather long. Spikelets small. Awns long and slender. Approaches *S. scabra*, to which it ought perhaps to be referred.

**W. Australia.** Ningham country beyond Arrowsmith River, where it covers the whole country, *Monger*.

*S. pubinervis*, Trin. and Rupr. Gram. Stip. 50, from Tasmania, is referred by Hooker to *S. pubescens*, although the outer glumes are described as all acute and entire, which is very rarely the case in *S. pubescens*.

12. ***S. aristiglumis***, *F. Muell. in Trans. Vict. Inst.* 1855, 43, *Fragm.* viii. 103.—Very nearly allied to *S. pubescens*, and should probably be added to its varieties. Habit and foliage the same. Panicle much looser, spikelets smaller, the outer glume usually produced into 1 to 3 fine points, the fruiting glume broader; awn of *S. pubescens* but usually glabrous.

**Queensland.** Brisbane River, *Bailey*; Darling Downs, *Woolfs*.

**N. S. Wales.** Liverpool plains and Cassilis, *Leichhardt*; Hunter's River, *United States Exploring Expedition*.

**Victoria.** Murray and Avoca Rivers, *F. Mueller*; Wimmera, *Wilson*.

13. ***S. eriopus***, *Benth.*—Bulblike stock and base of the lower leaves densely woolly-villous, the rest of the plant glabrous or the leaves minutely pubescent. Stems slender, 1 to 1½ ft. high. Leaves long, terete, rigidly filiform, very flexuose, the upper ones with long appressed sheaths; ligula very short, ciliate. Panicle narrow and loose, 6 to 10 in. long, with erect filiform branches. Outer glumes narrow, tapering into fine points, the lowest often 9 or 10 lines long, the 2nd shorter. Flowering glume scarcely 3 lines long, slightly hairy, on a long stipes. Awn very slender, glabrous, 3 to 4 in. long. Palea nearly as long as the glume.

**W. Australia.** Swan River, *Drummond*, 1st coll. and n. 962.

14. ***S. trichophylla***, *Benth.*—Stems slender, glabrous, 1 to 1½ ft. high. Leaves tufted at the base of the stem, short and filiform, the sheaths glabrous, rigid, smooth and shining, the lamina hispid with spreading hairs; stem-leaves few with long appressed sheaths; ligula very short and ciliate. Panicle narrow, 6 to 10 in. long, with few filiform branches. Outer glumes very narrow, tapering into fine points, the lowest about ½ in., the 2nd shorter. Awn capillary, under 2 in. long, glabrous or nearly so. Palea nearly as long as the glume.

**W. Australia,** *Drummond*, n. 122.

15. ***S. scabra***, *Lindl. in Mitch. Trop. Austr.* 31.—Stems in the







typical form slender, tufted, 1 to 2 ft. high. Leaves subulate or filiform, rather short, glabrous or slightly pubescent, the upper sheath scarcely dilated; ligula very short, more or less ciliate. Panicle very loose, 6 in. to above 1 ft. long, with long capillary slightly spreading glabrous branches and pedicels. Outer glumes at first almost hyaline, at length, especially in western specimens, often purplish or rigid, tapering into long points, the longest about  $\frac{1}{2}$  in. long. Flowering glume about 2 lines long, silky-hairy, entire at the tip. Awn fine, glabrous, 3 in. long or more. Palea nearly as long as the glume.

**N. S. Wales.** Bogan River, *Mitchell*; between the Lachlan and Darling, *Burkitt*; Murray River, *Dallachy*.

**Victoria.** Yarra River, *F. Mueller*; Ballarat, *Bacchus*.

The species, distinguished from *S. setacea* by the short fine ligula, from *S. pubescens* by the more slender habit, the outer glumes both with long fine points, and the long fine awns, appears to be very abundant in the desert country and very variable. It is thought by *F. Mueller* and others that it may be the true *S. eriantha*, Gaudich., but the maritime station of that plant (Sharks Bay), and narrow dense panicle, would point rather to *S. flavescens*, or *S. teretifolia*.

The following are among the principal forms in our herbaria besides the typical eastern plant:

Var. *occidentalis*. Spikelets usually rather larger and fewer, but I can see no other difference.—*S. flavescens*, Nees in Pl. Preiss. ii. 99, not of Labill.; *S. teretifolia* and *S. puberula*, Steud. Syn. Glum. i. 128.

**W. Australia.** King George's Sound to Swan River, *Drummond*, 1st coll. and n. 220, 379, 391, 900, 963, *Press*, n. 1826; Stirling Range and Kalgan, *F. Mueller*; Fraser's Range, *Dampier*; Champion Bay, *C. Gray*; Murchison River, *Oldfield*; Ningham country, *Monger*.

Var. *pubescens*. Lower sheaths pubescent, the upper one loose and broad, embracing the base of the panicle almost as in *S. compressa*, but the ligula entirely that of *S. scabra*.—W. Australia, *Drummond*, n. 375 and 973.

Var. *clatior*. Stem 3 to 4 ft. high. Lower sheath pubescent. Leaves broader and not so closely convolute at the base. Panicle long and narrow.—Swan River, *Drummond*, 1st coll. and n. 959; Murchison River, *Oldfield*.

Var. *stricta*. Panicle more dense. Outer glumes more rigid, prominently nerved and scarcely above 4 lines long.—W. Australia, *Drummond*, n. 133; Murchison River, *Oldfield*.

Var. *hirsuta*. Orifice of the leaf-sheaths densely bearded with long spreading hairs.—W. Australia, *Drummond*.

## 50. STREPTACHNE, R. Br.

Spikelets 1-flowered, on short filiform pedicels in a narrow terminal panicle, with the structure of *Stipa*, except that the awn is continuous with the end of the flowering glume without any articulation.

The limits and area of the genus are as yet very uncertain. *Orthoraphium R. & S.* Nees in Ann. Nat. Hist. ser. 1. vii. 221, from East India is certainly a congener, and may prove to be the same as the Australian species. Besides that,

two or three tropical American plants were first published as species of *Streptachne*, but afterwards removed by Kunth to a section of *Aristida* having the lateral lobes of the awn minute or obsolete.

1. ***S. stipoides***, *R. Br. Prod.* 174.—Only known from two very imperfect specimens, one in Herb. Banks, the other in Herb. R. Brown, each consisting of the summit of a stem without leaves, bearing a very slender and loose little-branched panicle of 5 to 6 in. Outer glumes 4 to 5 lines long, tapering into long fine points. Flowering glume narrow, glabrous, tapering into a very fine twisted and bent awn of  $\frac{3}{4}$  in. Stamens 3.

**Queensland.** Endeavour River, *Banks and Solander*.

SUBTRIBE II. AGROSTIDÆ.—Spikelets 1-flowered, paniculate, the rhachis articulate above the outer glumes and either not continued beyond the flower or produced into a bristle rarely bearing an empty glume. Awn of the flowering glume terminal or dorsal usually twisted and bent, rarely very small and straight or deficient. Lodicules (always 2). Grain enclosed in the usually thin glume, the palea sometimes minute or deficient usually thin, more exposed than in *Stipacæ*, less developed than in most *Avenacæ*.

### 51. PENTAPOGON, *R. Br.*

Spikelets 1-flowered, numerous in a rather dense much branched panicle, the rhachis of the spikelet articulate above the 2 outer glumes, with a tuft of hairs surrounding the flowering glume and not continued above it. Glumes 3, 2 outer persistent, membranous, acute or shortly pointed. Flowering glume narrow, rolled round the flower, divided at the end into 5 lobes or awns, the central one rigid, at length twisted, continuous with the keel and sometimes slightly dorsal, the lateral ones shorter and straight. Palea narrow, enclosed in the flowering glume. Lodicules 2. Styles short, distinct. Grain enclosed in the glume but free from it.

The genus is limited to the single species endemic in Australia.

1. ***P. Billardieri***, *R. Br. Prod.* 173.—An erect annual, from under 1 ft. to above 2 ft. high. Leaves narrow, hairy pubescent or rarely glabrous. Panicle narrow, erect or somewhat nodding, 2 to 6 in. long. Spikelets numerous, nearly sessile on the branches. Outer glumes narrow, varying from 3 to 6 lines long, almost hyaline, with a prominent shortly ciliate keel often produced into a short point. Flowering glume on a very short hairy stipes, the central awn terete, rigid,  $\frac{1}{2}$  to 1 in. long, the lateral lobes 2 on each side, much shorter, erect, slightly flattened and 1-nerved.—Hook, f. *Fl. Tasm.* ii. 112; *Agrostis quadrifida*, Labill. *Pl. Nov. Holl.* i. 20, t. 22 (the form



















figured an exceptionally starved one); *Stipa pentapogon*, F. Muell. Fragm. viii. 106.

**Victoria.** Wendu Vale, *Robertson*; Ballarat, *Bacchus*; Ararat, *Green*.

**Tasmania.** Port Dalrymple, *R. Brown*; Hobarton, *Oldfield*; Cheshunt, *Archer*; Launceston, *Gunn*; Swanport, *Story*.

**S. Australia.** St. Vincent's Gulf, *F. Mueller*; Barossa Range, *Behr*.

Var. *parviflorus*. Outer glumes scarcely 2 lines long, inner glume and awn in proportion.—Recherche Bay, *C. Stuart*.

## 52. DIPLOPOGON, R. Br.

(*Dipogonia*, Beauv.)

Spikelets 1-flowered, nearly sessile in a dense panicle contracted into an ovoid-globular head, the rhachis of the spikelet articulate above the 2 outer glumes and not continued beyond the flower. Glumes 3, the 2 outer ones persistent, keeled, tapering into fine short straight awns. Flowering glume scarcely raised above the outer ones, with a rigid terminal awn spirally twisted and curved down, and a short straight awn on each side of it. Palea as long as the glume, narrow and hyaline with 2 prominent nerves produced into short awns. Styles distinct. Grain not seen.

The genus is limited to the single species endemic in Australia. It is in many respects nearly allied to *Amphipogon*, among Pappophoræ, but the essentially twisted awn places it rather in Agrostidæ next to *Pentapogon*.

1. **D. setaceus**, R. Br. *Prod.* 176.—A slender glabrous erect grass of 1 to 2 ft., with the habit and inflorescence of *Amphipogon turbinatus*. Leaves narrow. Spikelike panicle or head ovoid-globular,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long without the awns. Outer glumes narrow, glabrous or minutely pubescent, 3 to 4 lines long, tapering into fine awns nearly or quite as long, especially the lowest one. Flowering glume slightly hairy, the central awn very rigid and thickened at the base, nearly as long as the awns of the outer glumes, but spirally twisted and curved down so as to appear much shorter, or very frequently curled round the 2nd glume, usually conspicuous from its whiteness in contrast with the purple outer glume; lateral lobes or awns short and erect, as well as the 2 awnlike lobes of the palea.—Nees in Pl. Preiss. ii. 102; *Dipogonia setacea*, Beauv. *Agrost.* 125.

**W. Australia**, King George's Sound and neighbouring districts, *R. Brown*, *Drummond*, n. 262, *Preiss*, n. 1853, *Oldfield*.

## 53. DICHELACHNE, Endl.

Spikelets 1-flowered, numerous in a narrow usually dense panicle, the rhachis of the spikelet articulate immediately above the 2 outer

glumes and not continued beyond the flower. Glumes 3, narrow, the 2 outer ones persistent, membranous, acute, keeled. Flowering glume raised on a short hairy stipes (rachis of the spikelet), membranous at the time of flowering, hyaline and entire or 2-lobed at the end, with a fine scarcely twisted dorsal awn a little below the end, slightly hardened round the fruit. Palea 2-nerved. Stamens 3 or fewer; anthers glabrous. Styles distinct. Grain enclosed in the glume and palea, free from them.

The genus is probably limited to the two Australian species which extend to New Zealand.

- Panicle very dense, the awns above 1 in. long, very numerous  
and concealing the spikelets . . . . . 1. *D. crinita*.  
Panicle rather loose, the awns 6 to 8 lines long . . . . . 2. *D. sciurea*.

1. *D. crinita*, Hook. f. *Fl. N. Zel.* i. 293, *Fl. Tasm.* ii. 111.—Stems 2 to 3 ft. high. Leaves flat, glabrous or softly pubescent, the upper ones rather long with long sheaths. Panicle very dense and spikelike, 4 to 8 in. long, the spikelets imbricate on the short erect branches but concealed by the numerous long hairlike awns. Outer glumes very narrow, hyaline with a slightly scabrous keel, nearly equal, about  $2\frac{1}{2}$  lines long. Flowering glume shorter, glabrous, the hyaline tip entire but readily splitting. Awn dorsal, very slender, bent but scarcely twisted, above 1 in. long.—*Anthoxanthum crinitum*, Linn. f. *Suppl.* 90; Labill. *Pl. Nov. Holl.* ii. 115, t. 263; *Agrostis crinita*, R. Br. *Prod.* 170; *Muehlenbergia crinita*, Trin. *Gram. Unifl.* 193; *M. mollicoma*, Nees in Hook. *Lond. Journ.* ii. 414; *Dichelachne Hookeriana*, *D. Forsteriana*, *D. comata* and *D. longiseta*, Trin. and Rupr. *Gram. Stip.* 3 to 5 (from the deser. and references); also Sieb. *Agrostoth.* n. 86.

Queensland. Moreton Bay, Leichhardt; Armidale, Perrot.

N. S. Wales. Port Jackson, R. Brown, C. Moore and others; North of Bathurst, A. Cunningham; Newcastle, Leichhardt; Clarence River, Beckler, C. Moore; Lord Howe's Island, C. Moore.

Victoria. From the Yarra to the western frontier, F. Mueller, Robertson and others.

Tasmania. Port Dalrymple, R. Brown; abundant throughout the island, J. D. Hooker, Labillardière and others.

S. Australia. Round St. Vincent's Gulf, F. Mueller, Behr.

W. Australia. King George's Sound, R. Brown, to Swan and Murchison Rivers, Oldfield, Drummond, n. 118, 130, 131, 380, and others.

The species is also in New Zealand.

2. *D. sciurea*, Hook. f. *Fl. N. Zel.* i. 294, *Fl. Tasm.* ii. 111, t. 158 A.—Stems densely tufted, slender, 1 to  $1\frac{1}{2}$  rarely 2 ft. high, quite glabrous, the nodes usually dark-coloured. Leaves short, chiefly at the base of the stem, scabrous-pubescent or glabrous. Panicle narrower and looser than in *D. crinita*, 3 to 6 in. long, the rachis and filiform branches scabrous. Outer glumes very narrow, about  $2\frac{1}{2}$  lines long, the outermost rather shorter than the 2nd. Fruiting glume rather more rigid than in *D. crinita* and minutely pitted-rugose. Awns 6 to 8







lines long, not nearly so crowded as in that species—*Agrostis sciurea*, R. Br. Prod. 171; Sieb. Agrostoth. n. 63; *Muehlenbergia ciurea*, Trin. Gram. Unifl. 193; *Agrostis rara*, Nees in Sieb. l. c. n. 70; *Dichelachne Sieberiana* and *D. vulgaris*, Trin. and Rupr. Gram. Stip. 2, 3; *D. montana*, Endl. Prod. Fl. Norf. 20 (from the character as revised by Trinius, Gram. Stip. 1).

**N. S. Wales.** Port Jackson, *R. Brown* and others; New England, *C. Stuart*.

**Victoria.** Loddon River and Wilson's promontory, *F. Mueller*.

**Tasmania.** Port Dalrymple, *R. Brown*; abundant throughout the island, *J. D. Hooker*.

**W. Australia?** *Drummond*, n. 964, may possibly be this species, but more probably one of the poorer forms of *D. crinita*, which approach it very nearly.

*Agrostis rara*, R. Br. Prod. 171, from Port Jackson, appears to me to be a slight variety of *D. sciurea* with a looser panicle and fewer spikelets.

Var. *setifolia*. Very slender, with almost filiform leaves, the sheaths scabrous.—Paramatta, *Woolfs*.

The species is also in New Zealand, and in Norfolk Island (Herb. Oldfield); Endlicher describes the awn as terminal between the two terminal lobes of the glume, but Trinius who saw Bauer's original specimen describes it as dorsal.

## 54. AGROSTIS, Linn. partly.

(*Agrostis* and *Trichodium*, *Nees*.)

Spikelets small, 1-flowered, pedicellate in a loose spreading or narrow panicle, the rachis of the spikelet articulate above the outer glumes, glabrous or nearly so, not produced beyond the flower. Glumes 3, 2 outer empty ones narrow, keeled, acute, unawned. Flowering glume shorter, broad, thin, enveloping the flower, unawned or with a dorsal awn, attached below the middle, fine and twisted. Palea not above half the length of the glume, very thin and hyaline, often very minute or none. Styles very short, distinct. Grain enclosed in the glume, free from it.

The genus as now limited is still very generally spread over the temperate and some warmer regions of both hemispheres. Of the four species here enumerated one is introduced only, another is also in New Zealand, a third appears to be identical with a common North American one, the 4th alone is strictly endemic,

Palea about half the length of the glume (*Euagrostis*).

No awn . . . . . 1. *A. alba*.

Palea none or rudimentary (*Trichodium*).

No awn. Outer glumes above 1 line long. Panicle narrow . . . . .

No awn. Outer glumes about  $\frac{3}{4}$  line. Panicle spreading . . . . . 2. *A. Muellerei*.

Awn nearly basal. Outer glumes about 1 line. Panicle spreading . . . . . 3. *A. scabra*.

spreading . . . . . 4. *A. venusta*.

\* 1. **A. alba**, Linn.; Kunth, *Enum.* i. 219.—A tufted perennial, from under 6 in. to above 1 ft. high. Leaves flat, narrow. Panicle pyramidal, sometimes rather loose and spreading, sometimes narrow and more dense. Spikelets very numerous. Outer glumes, narrow, keeled, acute, about 1 line long. Flowering glume shorter, broad, obtuse or truncate, rolled round the flower, unawned. Palea very thin and hyaline, about half as long as the glume.

A common European grass, now said to be naturalised in a few stations in **Victoria**, *F. Mueller*, and **Tasmania**, *Stor*, *C. Stuart*, *Hannaford*.

2. **A. Muelleri**, Benth.—A densely tufted grass, our specimens 2 to 6 in. high. Leaves very narrow. Panicle narrow, though rather loose, 1 to  $1\frac{1}{2}$  in. long, with short erect capillary branches. Spikelets purplish. Outer glumes very pointed, about  $1\frac{1}{4}$  lines long, glabrous or the keel minutely ciliate. Flowering glume much shorter, thin and hyaline, obtuse, enveloping the flower and grain, without any (or a minute and rudimentary?) palea. Stamens 3.—*A. gelida*, *F. Muell.* in *Trans. Vict. Inst.* 1855, 43, not of Trin.; *A. canina*, var. Hook. f. *Handb. N. Zeal. Fl.* 328.

**Victoria.** Cobberas Mountains and Mount Kosciusko, at an elevation of 5000 to 6000 ft. *F. Mueller*.

Also on high mountains in New Zealand.

3. **A. scabra**, Willd. *Spec. Pl.* i. 370.—Stems slender, tufted, 6 in. to above 1 ft. high. Leaves very narrow, almost filiform in the typical form, chiefly at the base of the stem. Panicle compound, very loose and slender, with spreading capillary branches. Outer glumes narrow, keeled, rather acute, about  $\frac{3}{4}$  line long. Flowering glume shorter, hyaline, broad and enveloping the flower, obtuse truncate or slightly jagged, unawned. Palea none (or very minute?). Stamens 3.—*A. parviflora*, R. Br. *Prod.* 170; Hook. f. *Fl. Tasm.* ii. 113, t. 158; *A. intricata*, Nees in Hook. *Lond. Journ.* ii. 413; *Trichodium laxiflorum*, Mich. *Fl. Bor. Am.* i. 42, t. 8; *Agrostis laxiflora*, Richards; Kunth, *Rev. Gram.* t. 130.

**Tasmania.** Adventure Bay, *Herb. R. Brown*; common in shady places, *J. D. Hooker*, *C. Stuart*.

Var. *elator*. Taller, leaves flatter and flaccid, panicle very loose and spreading.

**N. S. Wales.** Nattai, *Mrs. Calvert*; New England, *C. Stuart*.

**Victoria.** Dandenong Ranges, Broken River, sources of the Goulburn, *F. Mueller*; Portland, *Allitt*.

This has been identified by Munro with a common North American species which has a wide range and has been published under various names, of which Willdenow's has the right of priority, except perhaps a very inappropriate one of Fraser's.

4. **A. venusta**, Trin. in *Mem. Acad. Petersb. ser. 6*, vi. 340.—A slender tufted grass closely resembling the typical form of *A. scabra*







with still finer leaves. Panicle loose with long capillary branches, or contracted in some of the smaller specimens. Outer glumes very acute, about 1 line long. Flowering glume shorter, broad hyaline and remarkably truncate, enveloping the flower, with a dorsal twisted awn, affixed very near the base and protruding beyond the outer glumes. Palea none.—Hook. f. Fl. Tasm. ii. 113, t. 159.

**Victoria.** Ararat, *Green*; Ballarat, *Mrs. Glendinning*.

**Tasmania.** Abundant in dry grassy places, *J. D. Hooker* and others.

**W. Australia.** Perongerup, *F. Mueller*; Blackwood River, *Walcot*.

## 55. DEYEUXIA, Clarion.

(*Bromidium*, *Nees*.)

Spikelets 1-flowered, pedicellate or rarely sessile in a panicle either loose and spreading or narrow and spikelike, the rhachis of the spikelet articulate above the outer glumes, usually bearing a tuft of hairs round the flowering glume and usually produced beyond it in a small ciliate or rarely glabrous bristle very rarely bearing an empty glume or imperfect flower, sometimes very minute, rarely deficient. Glumes 3, 2 outer ones persistent, keeled, unawned; flowering glume shorter and very thin, about as long or rarely longer and membranous, broad, enclosing the flower, 5-nerved, with a fine dorsal awn usually bent and twisted, rarely short and straight or very rarely deficient. Palea thin, more than half as long as the glume, faintly or prominently 2-nerved. Styles distinct, short. Grain enclosed in the glume and palea and sometimes partially adhering to them.

A considerable genus, spread over the warmer and temperate regions both of the New and the Old World. Of the fifteen Australian species three are also in New Zealand, the remainder are apparently all endemic. They are frequently regarded as forming a section of *Agrostis*, from which they differ chiefly in the more developed palea and in the usual presence of the bristle continuing the rhachis of the spikelet, whilst others again refer *Deyeuxia* to the supposed distinct tribe *Arundineæ*, on account of the hairs surrounding the flowering glume. But these hairs are present in almost all species of *Agrostis*, and although in many species of *Deyeuxia* they are longer, yet they are never so long as in *Calamagrostis*, a northern genus closely allied both to *Agrostis* and to *Deyeuxia*, and equally referrible to Agrostideæ, whilst *Arundo* and *Pennisetum* would appear to be much better placed in Festuceæ. The bristle continuing the rhachis behind the palea, though the character generally relied on for separating *Deyeuxia* from *Agrostis* and constant in most species, is usually but not constantly wanting in *D. quadrifida* and its allies, distinguished by *Nees* under the name of *Bromidium*, but evidently very closely connected with other species where the bristle is constant.

Flowering glume very thin, almost hyaline, much shorter than the empty ones.

Panicle loose and spreading or in smaller plants narrow.

Rhachis of the spikelet produced into a hairy bristle.

Spikelets about  $\frac{1}{2}$  line long, unawned . . . . . 1. *D. æquata*.

- Spikelets  $1\frac{1}{2}$  to 2 lines long. Flowering glume usually hairy truncate or shortly toothed, the awn about the middle. Panicle spreading . . . . . 2. *D. Forsteri*.
- Spikelets about 3 lines. Outer glumes with long points. Flowering glume of *D. Forsteri*. Panicle narrow . . . . . 3. *D. Drummondiana*.
- Spikelets about 3 lines. Flowering glume glabrous with 2 long points, the awn almost basal. Panicle spreading . . . . . 4. *D. Billardieri*.
- Spikelets about  $1\frac{1}{2}$  lines. Flowering glume hairy, with 2 long points, the awn almost basal. Panicle narrow . . . . . 5. *D. plebeia*.
- Panicle dense and spikelike or shortly branched. Rhachis of the spikelet produced into a glabrous or minute bristle or not continued beyond the flower.
- Spikes 2 to  $2\frac{1}{2}$  lines long. Awn almost basal. Bristle of the rhachis conspicuous . . . . . 6. *D. montana*.
- Spikelets  $1\frac{1}{2}$  to 2 lines. Awn almost basal. Bristle of the rhachis minute or none . . . . . 7. *D. quadriseta*.
- Spikelets about 3 lines. Awn almost basal. Bristle of the rhachis minute or none . . . . . 8. *D. cylindrica*.
- Spikelets about 2 lines. Awn above the middle of the back. Bristle of the rhachis minute or none . . . . . 9. *D. minor*.
- Flowering glume nearly or quite as long as the outer ones, membranous, often minutely scabrous or pubescent.
- Panicle dense and spikelike. Awn dorsal about the middle of the flowering glume . . . . . 10. *D. densa*.
- Panicle very loose and long. Awn dorsal about the middle of the flowering glume but very deciduous . . . . . 11. *D. frigida*.
- Panicle very loose. Awn very small and straight above the middle of the flowering glume or reduced to a small point near the summit . . . . . 12. *D. scabra*.
- Panicle dense and spikelike. Leaves broad. Awn small and straight near the summit of the flowering glume . . . . . 13. *D. nivalis*.
- Flowering glume twice as long as the truncate outer ones. Spikelets very small in a loose panicle, awnless or with a minute point on the flowering glume.
- Outer glumes prominently keeled, rather acute. Stems under 6 in. . . . . 14. *D. Gumniana*.
- Outer glumes not keeled, truncate. Stems 1 to  $1\frac{1}{2}$  ft. . . . . 15. *D. breviglumis*.

1. *D. æquata*, *Benth.*—A weak glabrous grass of 1 to 2 ft. with the aspect of *Agrostis scabra*. Leaves flaccid, narrow but flat. Panicle very loose, 6 to 9 in. long, with numerous capillary spreading branches in regular distant whorls, or the upper ones in twos or threes. Spikelets numerous, pedicellate, smaller even than in *Agrostis scabra*. Outer glumes narrow, rather acute, but little more than  $\frac{1}{2}$  line long. Flowering glume shorter, broad, truncate, thinly membranous, glabrous, unawned, surrounded by a few hairs. Palca narrow. Rhachis produced into a



bristle ciliate with a few long hairs.—*Agrostis equata*, Nees in Hook. Lond. Journ. ii. 412; Hook. f. Fl. Tasm. ii. 114, t. 159.

**Tasmania**, *Gunn*, the precise station not indicated.

**2. D. Forsteri**, *Kunth*, *Enum.* i. 244.—A common grass, very variable in habit, usually erect or decumbent, 1 to 2 ft. high or rather more, with flat rather flaccid leaves, but sometimes smaller with convolute or fine almost filiform leaves. Panicle usually very loose and spreading when fully out, 6 in. to 1 ft. long, with long capillary divided branches in distant whorls or clusters. Spikelets very numerous. Outer glumes narrow, very pointed, 1 to 1½ lines long or in some varieties nearly 2 lines. Flowering glume about half as long, thin and almost hyaline, broad, enveloping the flower, truncate or very shortly and un-equally 2- or 4-toothed, sprinkled or densely covered with hairs on the back, rarely almost glabrous, surrounded by the hairs of the rhachis, with a fine twisted awn attached about the middle of the back. Palea very narrow. Rhachis produced into a bristle usually very short and ciliate with a few long hairs.—*Agrostis Forsteri*, Rœm. and Schult. Syst. ii. 359; *A. amula*, R. Br. Prod. 172; Hook. f. Fl. Tasm. ii. 115; *A. retrofracta*, Willd. Enum. Hort. Berol. 94; *Lachnagrostis retrofracta*, Trin. Fund. Agrost. 128; *L. Willdenowii*, Trin. Gram. Unifl. 217; *Calanagrostis amula* and *C. Willdenowii*, Steud. Syn. Glum. i. 192; *Agrostis debilis*, Poir. Dict. Suppl. i. 249 (from the deser. confirmed by Kunth); *A. Solandri*, F. Muell. Veg. Chath. Isl. 60; *A. semibarbata*, Trin. in Mem. Acad. Petersb. ser. 6. vi. 378 (from the char. given.)

**Queensland**. Warwick, *Beckler*; Darling Downs, *Woolfs*.

**N. S. Wales**. Port Jackson, *R. Brown*, *Sieber* (*Agrostoth.* n. 81); in the interior north of Bathurst, *A. Canadensis*; New England, *C. Moore*, *C. Stuart*; Clarence River, *Wiles*; Lord Howe's Island, *Fullagar*, the latter with rather longer outer glumes, but all the above with the normal very hairy flowering glume.

**Victoria**. Wendu Vale, *Robertson*; Melbourne and neighbouring districts, *F. Mueller* and others.

**Tasmania**. Port Dalrymple, *R. Brown*; abundant throughout the island, *J. D. Hooker* and others.

**S. Australia**. Around St. Vincent's Gulf, *P. Mueller* and others.

**W. Australia**. From Esperance Bay to King George's Sound and Swan River, *Dempster*, *Oldfield*, *Walcot*, *Drummond*.

Var. *aristata*. Outer glume produced into long points.—Swan River, *Pries*; Murchison River, *Oldfield*.

Var. *Preissii*. Spikelets of the var. *aristata*, but a smaller plant with fine leaves.—*Lachnagrostis Preissii*, Nees in Pl. Preiss. ii. 97.—W. Australia, *Preiss*, n. 1841.

Var. *laevigata*. Flowering glume nearly glabrous except marginal cilia.—Lake George, N. S. Wales, *Fraser*, *A. Cunningham*; Wendu Vale, Victoria, *Robertson*; and with the glume quite glabrous but without the long points of *D. Billardieri*, Red Jacket Creek, *Gargurevich*; Ararat, *Green*.

The species was originally published by Forster for the New Zealand plant under the name of *Agrostis glifera*, but as that name was then pre-occupied it was changed by Gmelin to *A. decurva*, and more appropriately by Rœmer and Schultes to *A. Forsteri*. Trinicus in transferring the plant to *Lachnagrostis* adopted for the

specific name first that of *filiformis*, then that of *Forsteri*. Kunth in fixing the species in *Deyeuxia* took the name of *Forsteri* as leading to the least confusion and which it seems advisable on all accounts to retain. Brown, whilst recognising the close affinity of the Australian to the New Zealand plant, thought nevertheless that it might be distinct and gave it the name of *A. æmula*, but already (though not to the knowledge of Brown) it had been raised in Continental Gardens from Australian seeds and published by Willdenow as *A. retrofracta* and by Poiret as *A. debilis*, and Kunth without means of comparison, entered both *æmula* and *retrofracta* as Australian species of *Deyeuxia* distinct from the New Zealand one. As it has now been found necessary to reunite the Australian with Forster's plant, it necessarily merges in the name of *D. Forsteri*, nor can I see any advantage in the entirely new name proposed by F. Mueller.

3. **D. Drummondiana**, *Benth.*—Stems erect, 1 to 2 ft. high, leafy to the panicle, the leaves narrow with rather broad sheaths as in *D. Billardieri*. Panicle narrow, rather dense, 4 to 8 in. long, the branches capillary, but erect or scarcely spreading, in distant whorls. Outer glumes narrow, at least 3 lines long and tapering into long points almost awned, the lowest rather shorter than the other. Flowering glume about 1 line long, hairy, shortly and unequally 4-toothed, the awn fixed about the middle of the back, twisted and projecting beyond the outer glumes. Palea small and narrow. Rhachis produced into a short ciliate bristle almost concealed by the hairs surrounding the glume.—*Dichelachne Drummondiana*, Steud. Syn. Glum. i. 120.

**W. Australia**, *Drummond*, n. 371.

4. **D. Billardieri**, *Kunth*, *Enum.* i. 244.—Stems sometimes very short and tufted, usually about 1 ft. high or more, leafy to the inflorescence, which is usually enclosed at the base in the broad sheath of the upper leaf. Panicle when fully out often nearly 1 ft. long though sometimes much smaller, with long capillary divided branches in regular whorls. Outer glumes very narrow and pointed, about 3 lines long. Flowering glume not half so long, quite glabrous, with 2 narrow pointed teeth, the dorsal awn attached much below the middle and rather longer than the outer glumes. Palea shorter and narrow. Rhachis produced into a hairy bristle.—*Avena filiformis*, Labill. Pl. Nov. Holl. i. 24, t. 31; *Agrostis Billardieri*, R. Br. Prod. 171; Hook. f. Fl. Tasm. ii. 115.

**N. S. Wales.** Port Jackson, *R. Brown*; Clarence River, *Wilcox*.

**Victoria.** Portland, *Allitt*; Port Phillip, *Harvey*.

**Tasmania.** *Gunn*; King's Island, *Neate*.

**S. Australia**, *Behr*.

Also in New Zealand. This is evidently the plant figured by Labillardière, although his herbarium contained also the *D. Forsteri*.

5. **D. plebeia**, *Benth.*—A slender tufted erect grass of 6 to 10 in., apparently annual. Leaves very narrow, almost filiform. Panicle narrow but loose, 2 to 4 in. long, the filiform branches scattered or in twos or threes, erect or slightly spreading. Outer glumes very narrow and pointed, under 1½ lines long. Flowering glume thin and hairy,

about half as long but with 2 fine teeth or lobes almost as long as the outer glumes. Awn attached very near the base, exceeding the outer glumes. Palea small and narrow. Rhachis produced into a minute hairy bristle almost concealed in the hairs surrounding the glume.—*Agrostis plebeia*, B. Br. Prod. 172; *Didymochaeta australis*, Steud. Syn. Glum. i. 185.

**N. S. Wales.** Port Jackson, *R. Brown*.

**S. Australia.** Crystal Brook, *F. Mueller*.

**W. Australia.** Drummond, n. 223 and 370.

**6. D. montana, Benth.**—Stems from under 1 ft. to above 2 ft. high. Leaves in the smaller specimens very narrow almost subulate, in the larger ones flat and 2 to 3 lines broad. Panicle dense and spike-like or slightly branched and interrupted at the base, 2 to 4 in. long. Spikelets crowded on the short erect branches. Outer glumes narrow, very acute, rather rigid, 2 to  $2\frac{1}{2}$  lines long. Flowering glume short, glabrous, shortly 2- or 4-toothed, the awn attached much below the middle and exserted. Palea smaller. Rhachis bearing but few short hairs and produced into a glabrous or slightly hairy bristle, either very short or lengthened and occasionally bearing an empty glume or imperfect flower.—*Agrostis montana*, R. Br. Prod. 171; Hook. f. Fl. Tasm. ii. 116.

**Victoria.** Moyston, *Sullivan*.

**Tasmania.** Table Mountain (Mount Wellington), *R. Brown*; common on the mountains, *J. D. Hooker*; South Esk River, *C. Stuart*.

**S. Australia.** Lofty and Bugle Ranges, *F. Mueller*.

**7. D. quadriseta, Benth.**—A glabrous and smooth or scabrous erect perennial, very variable in stature, usually 1 to 3 ft. high. Leaves narrow, erect or spreading, flat or convolute when dry. Panicle dense and spikelike, varying from  $1\frac{1}{2}$  or 2 in. to 8 or 10 in. long, when small closely cylindrical, when large more branched, but the spikelets always densely crowded from the base of the short erect branches. Outer glumes narrow, very acute, with a scabrous or minutely ciliate keel, the sides smooth,  $1\frac{1}{2}$  to near 2 lines long. Flowering glume shorter, broad hyaline and rolled round the flower, the 2 nerves on each side more or less produced into acute teeth or points. Awn attached much below the middle or close to the base, usually not much longer than the outer glumes. Palea narrow. Rhachis of the spikelet hairy round the flower, produced sometimes into a minute bristle which however appears to be generally deficient.—*Avena quadriseta*, Labill. Pl. Nov. Holl. i. 25, t. 32; *Agrostis quadriseta*, R. Br. Prod. 171; Trin. Spec. Gram. t. 33; Hook. f. Fl. Tasm. ii. 114; *A. lobata*, R. Br. l. c.; *A. diaphora*, Trin. in Mem. Acad. Petersb. ser. 6, vi. 366; *Bromidium quadrisetum*, Nees in Hook. Lond. Journ. ii. 416; *B. lobatum*, Nees, l. c. 415.

**S. Wales.** Paramatta, *Wells*; New England, *Perratt*; head of the Gwydir, *Leichhardt*.

**Victoria.** Numerous localities from the Murray and Yarra to Gipps' Land, *F. Mueller* and others.



**Tasmania.** Port Dalrymple, *R. Brown*; abundant throughout the island, *J. D. Hooker* and others.

**S. Australia.** From the hills about St Vincent's Gulf to the Murray, *F. Mueller* and others.

**W. Australia.** Blackwood and Tweed Rivers, *Oliphant*; Warren River, *Walest*; Swan River, *Helmich*.

Also in New Zealand.

**8. *D. cylindrica*, Benth.**—A tufted grass of 6 to 10 in. Leaves narrow but flat. Panicle 1 to  $1\frac{1}{2}$  in. long, dense and spikelike but much looser than in *D. quadriseta*. Spikelets much fewer than in that species, sessile on the short branches. Outer glumes narrow, acutely acuminate, about 3 lines long or the lowest rather shorter, the keel minutely ciliate. Flowering glume much shorter, broad and thin, glabrous or slightly hairy, entire or shortly 2- or 4-toothed. Awn attached below the middle and shortly protruding from the outer glume. Palea not much shorter than the glume. Rhachis produced into a minute bristle or more frequently not perceptibly continued beyond the flower.—*Agrostis cylindrica*, K. Br. Prod. 171; *Pentapogon Drummondii*, Steud. Syn. Glum. i. 193.

**W. Australia.** King George's Sound, *R. Brown*; towards Cape Riche, *Drummond*, 5th coll. n. 448; Perongerup, *F. Mueller*.

**9. *D. minor*, Benth.**—Usually smaller and more slender than *D. quadriseta*, the stems 6 in. to above 1 ft. high. Spikelike panicle 1 to 2 in. long, not nearly so dense as in *D. quadriseta*, often purplish. Outer glumes about 2 lines long, very acute. Flowering glume short and broad, finely 4-pointed. Awn affixed above the middle of the back, shortly exceeding the outer glumes. Palea narrow. Rhachis hairy round the flowering glume, not perceptibly produced beyond it in the spikelets examined, but probably occasionally with the minute bristle of the two preceding species.—*Agrostis quadriseta*, var. *minor* or *A. minor*, *F. Muell. Herb.*

**Victoria.** Grampian Range and Wilson's Promontory, *F. Mueller*.

**Tasmania.** Southport, *C. Stuart*.

**10. *D. densa*, Benth.**—Stems 1 to  $1\frac{1}{2}$  ft. high. Leaves narrow, flat. Panicle dense and spikelike or slightly lobed, 2 to 3 in. long. Spikelets crowded on the short erect compound branches. Outer glumes keeled, with scarious sides,  $1\frac{1}{2}$  lines long, rather acute. Flowering glume nearly as long, acuminate, entire but prominently 4-nerved above the awn, glabrous, membranous, but rather firm when in fruit and very minutely scabrous-rugose, the awn about the middle of the back, twisted and exserted. Palea shorter, very thin. Rhachis with rather long hairs surrounding the glume and produced into a rather long hairy bristle.

**Victoria.** Wilson's Promontory, Maroka Valley and the Yarra River, *F. Mueller*.

**S. Australia.** Lofty Ranges and Onkaparinga, *F. Mueller*.



11. **D. frigida**, *F. Muell.*—Stems weak and general habit of *D. scabra*, but usually taller, attaining sometimes 4 or 5 ft. Panicle as in that species long and loose with scattered branches. Spikelets rather larger. Outer glumes very acute, 2 lines long or rather more. Flowering glume not much shorter, 5-nerved, nearly smooth or slightly scabrous in fruit, with a fine twisted awn attached a little above the middle and very deciduous, leaving usually on the fruiting glume a small dorsal notch.—*Agrostis frigida*, *F. Muell. Herb.*

**Victoria.** Mount Buller, *F. Muell.*, the specimens past flower showing only the persistent outer glumes, the very few fruiting glumes remaining have lost their awns only showing the dorsal notch terminating the midrib halfway up.

**Tasmania,** *Oldfield*; New Norfolk, *Gunn.*

12. **D. scabra**, *Benth.*—Stems usually weak and decumbent, 1 to 2 ft. long. Leaves flat, flaccid. Panicle loose, varying from 2 to 8 in., the capillary branches short, scattered or in twos or threes, distant in the longer panicles, few in the short ones, not very spreading. Outer glumes 1 to  $1\frac{1}{2}$  lines long, acute, keeled or the 2nd 3-nerved. Flowering glume scarcely shorter or at length rather longer, membranous, rather stiff in fruit and minutely scabrous-pubescent, the awn minute and straight, attached far above the middle and usually not exceeding the glume. Palea almost as long, rather broad. Rhachis with few hairs and produced into a bristle minute and glabrous or longer and hairy.—*Agrostis scabra*, *R. Br. Prod.* 172; *Hook. f. Fl. Tasm.* ii. 116, t. 160; *A. rudis*, *Röm. and Schult. Syst.* ii. 360; *Calamagrostis rudis*, *Steud. Syn. Glum.* i. 192; *A. contracta*, *F. Muell.: Herb. Hook. f. l. c. t.* 161; *A. decipiens*, *R. Br. Prod.* 172; *Cianna decipiens*, *Kunth, Enum.* i. 207.

**Queensland.** Condamine River, *Hartmann.*

**N. S. Wales.** Port Jackson, *R. Brown*; New England, *C. Stuart.*

**Victoria.** Upper Hume River, Dandenong and Buffalo Ranges, *Tyer's River*, Sealer's Cove, *F. Mueller.*

**Tasmania.** Adventure Bay, *Nelson?* in *Herb. R. Br.*; Upper Huon River, *Gunn.*

The northern specimens have generally rather smaller spikelets than the southern ones, excepting *Brown's* typical ones in which they are smaller than in almost any of ours. I can perceive nothing to distinguish the *A. contracta* as a species, and *Brown's A. decipiens* appears to me to be a slight variety with narrow leaves. *A. distans*, *Kunze*, raised from Australian seeds in the Leipzig Garden, is also most probably, from the very short character given in *Steud. Syn. Glum.* i. 176, the *D. scabra*.

13. **D. nivalis**, *Benth.*—Stems rather stout, under 1 ft. high, covered to the inflorescence by the leaf-sheaths. Leaves flat short and broad, rather stiff, crowded at the base of the stem. Panicle dense and spikelike,  $1\frac{1}{2}$  to 2 in. long, rather dark coloured, the short fine awns scarcely conspicuous. Outer glumes under 2 lines long, very acute, rather rigid and shining. Flowering glume rather shorter, glabrous but surrounded by the hairs of the very short rhachis or stipes, the hyaline apex obtuse and entire or scarcely notched. Awn slender, attached below the summit and projecting but little beyond it. Palea

rather broad. Rhachis produced into a short glabrous bristle.—*Agrostis nivalis*, F. Muell. in Trans. Vict. Inst. 1855, 43.

**Victoria.** Grassy summits of Mount Buller, F. Mueller.

14. **D. Gunniana**, Benth.—A slender tufted glabrous grass, under 6 in. high, apparently annual. Leaves very narrow, almost setaceous. Panicle loose, ovate or pyramidal, 1 to 2 in. long, with capillary clustered spreading divided branches. Spikelets about  $\frac{1}{4}$  line long. Outer glumes scarcely  $\frac{1}{3}$  line, rather acute, with a prominent minutely ciliate or almost glabrous keel. Flowering glume twice as long, thin, 3- or 5-nerved, truncate or minutely toothed with a fine point attached very near the top and scarcely exceeding it. Palea about as long as the glume. Rhachis almost glabrous, continued into a slightly hairy bristle half as long as the glume.—*Echinopogon Gunnianus*, Nees in Hook. Lond. Journ. ii. 413.

**Tasmania**, *Gunn.* sent with *Agrostis scabra*, our specimens much depauperated, but the one in Herb. Lindl. described by Nees is a full-grown and very satisfactory one.

15. **D.? breviglumis**, Benth.—A slender grass of 1 to 1½ ft. Leaves almost filiform. Panicle rather loose, pyramidal, 1½ to 2 in. long, with capillary but short and rather rigid divided branches, the very small spikelets pedicellate. Outer glume scarcely  $\frac{1}{2}$  line long, very broad, obtuse or truncate. Flowering glume nearly twice as long, rather obtuse, the keel often produced into a very short point. Palea nearly as long as the glume. Rhachis glabrous, continued into a glabrous bristle nearly as long as the palea.

**N. S. Wales.** New England, C. Stuart. This species, remarkable for the short truncate outer glumes and glabrous rhachis, may not be a true congener. Munro thinks it might be referrible to the American genus *Cinna*, which however has not been yet satisfactorily worked up and defined.

**SUBTRIBE III. AVENACEÆ.**—Spikelets with 2, or in a few genera more than 2 perfect flowers, very rarely reduced to 1, paniculate, the rhachis of the spikelet articulate above the outer glumes, usually bearing a tuft of hairs under the flowering glumes, and (except in some *Airæ*) produced above them, frequently bearing an empty glume or imperfect flower. Awn of the flowering glume dorsal or terminal between the lobes of the glume, more or less twisted and bent. Palea as long or nearly as long as the glume, with 2 prominent nerves or keels. Grain enclosed in the glume and palea and free or adnate to the palea.

## 56. AIRA, Linn. (partly).

Spikelets 2-flowered, small, in a loose or rarely contracted panicle with capillary branches, the rhachis of the spikelet articulate and minutely hairy between the flowering glumes and not at all or scarcely











produced beyond them. Glumes thinly scarious, 2 outer empty ones nearly equal, acute; flowering glumes close above them, shorter, thin and hyaline, finely pointed or shortly bifid, with a fine awn dorsally attached below the middle and twisted at the base. Palea 2-nerved. Styles short, distinct. Grain enclosed in and more or less adnate to the very thin glume and palea.

A small genus, generally distributed over the temperate regions of both the northern and southern hemispheres, both the Australian species the same as northern ones, and one of them probably introduced only. The genus was formerly made to include *Deschampsia*, *Airapis*, *Corynephorus* and others, which some botanists still retain in it, but then it is difficult to assign any limits to separate it from *Avena* on one side and from *Isachne*, *Microira* and *Celachne* on the other. Other botanists distinguish generically almost every species usually retained in *Aira*.

Panicle loosely spreading, almost trichotomous . . . . 1. *A. caryophyllea*.  
Panicle narrow and dense, almost spikelike . . . . 2. *A. præcox*.

1. ***A. caryophyllea***, Linn.; Kunth, *Enum.* i. 289.—A slender elegant tufted annual, rarely above 6 in. high. Leaves short and fine. Panicle loose and spreading, the capillary branches in pairs or threes. Spikelets erect, silvery-shining. Outer glumes 1 to  $1\frac{1}{2}$  lines long, almost scarious, very acute. Flowering glumes shorter, the dorsal awn projecting about a line beyond the outer glume.—Reichb. Ic. Fl. Germ. t. 94.

**Victoria.** Various localities about Melbourne, *F. Mueller* and others; Moyston, *Sullivan*; Ballarat, *Bacchus*.

**Tasmania.** Swanport, *Story*.

Generally distributed over the area of the genus.

\* 2. ***A. præcox***, Linn.; Kunth, *Enum.* i. 289.—A slender annual of 2 to 4 in. or rarely attaining 6 in. Leaves few, short and fine. Panicle contracted, almost spikelike,  $\frac{1}{2}$  to 1 in. long. Spikelets not very numerous, erect. Outer glumes scarious, shining, acute, 1 to  $1\frac{1}{4}$  lines long. Flowering glumes shorter, thin and hyaline, finely pointed but shortly bifid, the lowest sessile, the second very nearly sessile, with a few short hairs on the rhachis, which appears to be sometimes produced into a minute clavate bristle. Awn attached below the middle of the flowering glumes and shortly exceeding the outer ones.—Reichb. Ic. Fl. Germ. t. 94.

**Victoria.** Port Phillip, *Walter*.

**W. Australia.** King George's Sound, *Oldfield*, *F. Mueller*.

A West European and Mediterranean grass, probably introduced only into Australia.

### \* 57. **HOLCUS**, Linn.

Spikelets 2-flowered, numerous and crowded in an open panicle, the lower flower hermaphrodite, the upper one male, the rhachis glabrous and produced above the outer glumes. Outer empty glumes 2, nearly

equal, complicate, keeled, awnless, enclosing the flowers. Flowering glumes shorter, the lowest awnless, the upper one with a short dorsal twisted awn.

The genus is limited to two species, spread over the temperate regions of the northern hemisphere in the Old World, of which one has now become naturalised in Australia as in South Africa.

\* 1. **H. lanatus**, Linn.; Kunth, *Enum.* i. 34.—A perennial grass, with a creeping rhizome and ascending stems of 1 to 2 ft., more or less clothed as well as the leaves with a very short pubescence, which gives the whole plant a pale soft appearance. Panicle 2 to 3 in. long, pale or occasionally somewhat darker coloured. Outer glumes about 2 lines long, rather obtuse, the awn of the upper flowering glume rarely reaching their length.—Reichb. Ic. Fl. Germ. t. 105; F. Muell. *Fragm.* viii. 126.

Now abundantly naturalised about Moreton Bay in **Queensland**, and in various localities in **N. S. Wales**, **Victoria** and **Tasmania**, *F. Mueller* and many others.

#### \* 58. **ARRHENATHERUM**, Beauv.

Spikelets 2-flowered, in a loose panicle, the lower flower male only. the rachis hairy, articulate below the lowest flower and produced into a short point or bristle above the upper one. Outer empty glumes unequal, acute, keeled, thinly scarious on the sides. Flowering glumes close together, thinly scarious, 5- or 7-nerved, the lowest enclosing a male flower, with a dorsal twisted awn attached near the base, the uppermost with a fertile flower unawned. Palea prominently 2-nerved. Stigmas sessile. Grain enclosed in the glume and palea, free from them. Seed not furrowed.

The genus is limited to a single species of European origin, introduced into Australia.

\*1. **A. avenaceum**, Beauv. *Agrost.* 55. t. 11, f. 5.—An erect perennial of 2 or 3 ft., not forming large tufts. Leaves few and flaccid. Panicle narrow and loose, 6 to 8 in. long, spreading when the flowers are open. Spikelets 4 to 5 lines long, the inner empty glume nearly as long as the flowering ones, the outer one shorter. Lowest male flowering glume usually 5-nerved, the awn about twice its own length. Glume of the perfect flower about 7-nerved, with sometimes a minute point near the apex, but no awn. Grain pubescent.—Kunth, *Enum.* i. 307; Reichb. Ic. Fl. Germ. t. 104; *Avena elatior*, Linn.

**Victoria.** Now established on the Upper Loddon, *F. Mueller*.

















### 59. DESCHAMPSIA, Beauv.

Spikelets 2-flowered, in a loose or rarely contracted panicle with slender branches, the rhachis of the spikelet articulate, hairy, more or less produced between the flowering glumes and beyond the upper one as a hairy bristle or rarely bearing a terminal empty glume. Glumes keeled, with thinly scarious sides, 2 outer empty ones rather acute; flowering glumes obtuse or truncate and more or less 4-toothed, with a fine dorsal awn attached below the middle, the lowest close above the empty glumes, the upper raised on a stipes (the rhachis of the spikelet). Palea prominently 2-nerved, often 2-toothed. Styles short, distinct. Grain enclosed in the glume and palea, usually free from them.—Perennial grasses with the shining spikelets of *Trisetum* and *Aira*, usually smaller than in the former, larger than in the latter genus.

The genus is generally distributed over the temperate regions of the northern hemisphere, and is also represented without the tropics in the southern hemisphere. The only Australian species ranges generally over the generic area.

**1. *D. cæspitosa*, Beauv.** *Agrost.* 91, t. 18, f. 3.—A tall perennial forming large dense tufts. Leaves stiff, narrow, usually rough on the upper surface, flat or convolute when dry. Stems attaining 2 to 4 ft., although sometimes much shorter. Panicle 4 in. to near 1 ft. long, at first rather dense, spreading with capillary branches when fully out. Outer glumes  $1\frac{1}{2}$  to near 2 lines long, the flowering ones not exceeding them, truncate and 4-toothed, the awns very slender, scarcely or not at all twisted at the base and usually shorter than the glumes themselves.—Kunth, Enum. i. 286; Hook. f. Fl. Tasm. ii. 118; *Aira cæspitosa*, Linn.; Reichb. lc. Fl. Germ. t. 96; Trin. Spec. Gram. t. 283.

**Victoria.** Avon and Omeo Rivers, and Haidinger Range, *F. Mueller*.

**Tasmania.** Frequent in wet places on low grounds as well as in the mountains. *J. D. Hooker* and others.

**S. Australia.** Between Rivoli Bay and Mount Gambier, *F. Mueller*.

Widely spread over the temperate and cool regions of the northern hemisphere, also in New Zealand and in Fuegia.

### 60. TRISETUM, Beauv.

Spikelets 2- rarely 3-flowered, in a narrow and dense or loose panicle, the rhachis of the spikelet articulate hairy and more or less produced between the flowering glumes and beyond the upper one as a hairy bristle or bearing a terminal empty glume or male flower. Outer empty glumes unequal, acute, keeled, thinly scarious on the sides. Flowering glumes more hyaline, keeled, acute or shortly 2-fid, with a dorsal awn attached above the middle, usually twisted at the base and bent in the middle. Palea prominently 2-nerved, usually 2-toothed. Styles distinct, stigmatic from near the base. Grain glabrous,

enclosed in the glume and palea but free from them. Seed not furrowed.

The genus is generally distributed over the temperate and cooler or mountain regions of both the northern and southern hemispheres. The only Australian species is a widely spread arctic, antarctic or mountain one.

1. **T. subspicatum**, *Beauv.*; *Kunth, Enum. i.* 295.—A tufted perennial, varying from 6 in. to above 2 ft. high. Leaves flat, glabrous or rarely pubescent, the sheaths rather loose, the ligula large and scarious. Panicle dense almost spike-like, but much interrupted or shortly branched in the lower part, 2 to 4 in. long, silvery-shining as in *Deschampsia*. Spikelets loose and flattened, the lowest outer glume nearly 2 lines long, the 2nd rather longer, the keel minutely ciliate. Lowest flowering glume sessile above the outer ones,  $2\frac{1}{2}$  to near 3 lines long, the awn sometimes scarcely exceeding it sometimes twice as long; upper flowering glume smaller but inserted higher up so as to be raised to the same level and sometimes containing only a male flower, the rhachis produced beyond it into a slender bristle, rarely bearing a terminal empty glume.—*Hook. f. Fl. Tasm. ii.* 119.

**Victoria.** Munyong and other mountains of the Australian Alps, the specimens mostly glabrous, but some from Mitta-Mitta with pubescent leaves, *F. Mueller*.

**Tasmania.** Common in Alpine localities, *J. D. Hooker* and others; our specimens all glabrous.

#### \* 61. **AVENA**, Linn.

Spikelets few-flowered, in a loose panicle, the rhachis articulate above the 2 outer glumes, hairy under the flowering glumes. Glumes scarious, at least at the top, the 2 outer empty ones lanceolate, tapering to a point; flowering glumes smaller, shortly 2-cleft at the top, with a long dorsal twisted awn, the terminal glume often small and empty or rudimentary. Styles distinct. Grain pubescent or hairy, frequently adhering to the palea. Seed deeply furrowed.

A considerable genus widely spread over the temperate and cooler regions of the world, but represented in Australia only by an introduced weed.

\* 1. **A. fatua**, *Linn.*; *Kunth, Enum. i.* 302.—An erect glabrous annual, 2 or 3 ft. high, with a loose panicle of large spikelets, hanging from filiform unequal pedicels, arranged in alternate branches along the main axis. Outer glumes nearly  $\frac{3}{4}$  in. long. Flowering glumes 2 or 3, scarcely so long, of a firm texture at the base, and covered outside with long brown hairs. Awn fully twice as long as the spikelet, twisted at the base, abruptly bent about the middle. Ovary hairy.

A common weed of cultivation in all corn countries, probably a native of the east Mediterranean region, now established as apparently wild in **S. Australia** and on the Wimmera, in **Victoria** (*F. Mueller*).















## 62. AMPHIBROMUS, Nees.

Spikelets several-flowered, in a loose panicle, the rachis of the spikelet articulate hairy and slender between the flowering glumes. Outer empty glumes acute, keeled, with scarious margins, 5-nerved near the base. Flowering glumes more rigid, prominently 5-nerved, with a dorsal twisted and bent awn attached about the middle. Palea prominently 2-toothed. Styles short, distinct. Grain glabrous, enclosed in the glume and palea, and perhaps adnate. Seed deeply furrowed.

The genus is limited to the single species endemic in Australia.

1. **A. Neesii**, Steud. *Syn. Glum.* i. 328.—A glabrous erect grass of 2 or 3 ft. or even taller in marshy situations. Leaves very narrow in the smaller specimens, broader in the larger ones, with rather broad loose sheaths. Panicle 6 to 10 in. long, loose and narrow. Spikelets all pedicellate, on capillary branches, usually about  $\frac{1}{2}$  in. long without the awns, 5- to 10-flowered. Outer glumes varying from 2 to 4 lines long. Flowering glumes rather longer, the 5 nerves reaching to the end and when old often splitting at the apex between the nerves, rather rigid and scabrous-rugose when in fruit.—*Amphibromus*, Nees in Hook. Lond. Journ. ii. 420; *Avena nervosa*, R. Br. Prod. 178; *Danthonia nervosa*, Hook. f. Fl. Tasm. ii. 121, t. 163.

**N. S. Wales.** Port Jackson, R. Brown, Woolls.

**Victoria.** Wendu Vale, Robertson; Edwards River, Station Creek, F. Mueller; Ballarat, Bacchus; Moyston, Sullivan.

**Tasmania.** Port Dalrymple, Paterson; Formosa, Gunn; South Esk River and Southport, C. Stuart.

**S. Australia** St. Vincent's Gulf, F. Mueller.

**W. Australia.** King George's Sound and neighbouring districts, F. Mueller, Oldfield, Drummond, n. 145, 146, 978, 979 and others.

Nees never appears to have published any specific name for this plant. In Lindley's herbarium he has named it *A. junceus*. Hooker quotes it as *A. nervosus*, Nees.

*Danthonia Archeri*, Hook. f. Fl. Tasm. ii. 122, t. 163, appears to me to be the same species, the specimens are in a bad state with old flowering glumes more or less split at the apex between the nerves.

## 63. ANISOPOGON, R. Br.

Spikelets 1-flowered, large, in a loose but scarcely branched panicle, the rachis of the spikelet articulate above the 2 outer glumes and produced into a slender bristle above the flower occasionally bearing an imperfect spikelet. Glumes 3, the 2 outer herbaceous; flowering glume raised on a short stipes (the rachis of the spikelet), narrow, convolute, hard, with 3 rigid awns between 2 small hyaline terminal



lobes, the central awn long twisted and bent. Palea hard, ending in a long rigid 2-nerved point. Styles distinct. Ovary crowned by a tuft of hairs.

Besides the Australian species which is endemic, there is one from South Africa.

1. *A. avenaceus*, *R. Br. Prod.* 176.—An erect glabrous grass of 2 or 3 ft., branching at the base only. Leaves convolute, terminating in subulate points; ligula very short, truncate, often ciliate. Panicle long, the large spikelets hanging from slender pedicels. Outer glumes narrow, about 9-nerved,  $1\frac{1}{2}$  to 2 in. long. Flowering glume about  $\frac{1}{2}$  in. long, the central awn  $2\frac{1}{2}$  to 3 in. long, the lateral ones finer and not half so long. Palea longer than the entire part of the glume. Lodicules long and lanceolate. Terminal barren spikelet when present small and silky-villous.—*Beauv. Agrost. t. 9, f. 8*; *Kunth, Rev. Gram. t. 62*; *Sieb. Agrostoth. n. 56*.—*Deyouzia avenacea*, *Spreng. Syst. i. 254*; *Danthonia anisopogon*, *Trin. Spec. Gram. t. 61*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown, C. Moore, Mrs. Calvert*; Clarence River, *Wilcox*.

#### 61. DANTHONIA, DC.

Spikelets several-flowered, pedicellate or rarely almost sessile, in a panicle either loose or reduced to a single raceme, the rhachis of the spikelet articulate above the outer glumes, hairy round the flowering ones. Outer empty glumes 2, narrow, keeled, acute, unawned, usually as long as the spikelet. Flowering glumes convex at the back, usually 9-nerved, with 2 rigid or scarious terminal lobes more or less 1- or 3-nerved at least at the base, and a twisted and bent awn between them (almost reduced to a point in one species). Palea broad, as long as or usually longer than the entire part of the glume, obtuse or 2-pointed. Styles distinct. Ovary glabrous. Grain free.

The genus extends over New Zealand, South Africa and the temperate regions of the northern hemisphere, with a very few tropical species in Africa and perhaps in America. Of the eleven Australian species, one is also in New Zealand, the others apparently endemic.

**SECT. I. *Micrathera*.**—Panicle very loose. Spikelets nearly glabrous. Awn of the flowering glume not exceeding the very short lateral lobes.

Single species . . . . . 1. *D. paradoxa*.

**SECT. II. *Monachathera*.**—Panicle almost reduced to a raceme or very short. Flowering glumes with a broad obliquely turbinate hard base and ciliate with long hairs, the awn shorter or scarcely longer than the lobes.

Spikelets distant, in an almost simple raceme. Lobes  
of the flowering glumes lanceolate, 2 or 3 times as  
long as the base . . . . . 2. *D. bipartita*.





Spikelets few, in a very short panicle. Lobes of the flowering glumes not longer than the base . . . . 3. *D. carphoides*.

SECT. III. **Eudanthonia.**—*Flowering glume oval or oblong at the base, scarcely oblique, ciliate at least at the base. Awn longer than the lateral lobes.*

Panicle loose. Spikelets numerous. Hairs of the flowering glume marginal and scattered or in longitudinal series on the back; lateral lobes acute or scarcely awned . . . . . 4. *D. pallida*.

Panicle rather dense. Flowering glumes very small, with copious long hairs, lateral lobes very short with long awns. Leaves long and filiform . . . . . 5. *D. longifolia*.

Panicle narrow or dense. Flowering glumes oblong, with long marginal cilia but very few hairs on the back.

Stems stout, 3 to 5 ft. high. Leaves long, with long loose sheaths. Panicle branched . . . . . 6. *D. robusta*.

Stems under 2 ft. high. Leaves narrow. Panicle reduced to a single raceme or the lower pedicels with 2 spikelets . . . . . 7. *D. racemosa*.

Stems under 2 ft. high. Leaves very narrow. Panicle dense . . . . . 8. *D. pilosa*.

Panicle dense or rather loose. Flowering glumes oblong, with a ring of long hairs at or below the base of the lobes.

Outer glumes not much exceeding the spikelet. Leaves narrow but not setaceous . . . . . 9. *D. semiannularis*.

Outer glumes much longer than the spikelet. Leaves very fine in a short radical tuft . . . . . 10. *D. setacea*.

Panicle small, few-flowered. Flowering glumes ciliate with long hairs, the lobes broad, not longer than the base. Small Alpine plant . . . . . 11. *D. pauciflora*.

*Plintha thes Urvilkei* and *P. tenuis*, Steud. Syn. Glum. i. 14, from the Blue Mountains, *Durville*, are probably amongst the plants we have, but I cannot recognise them from Steudel's character. They may be ill-described species of *Danthonia*, but the twisted awn said to be attached to the side of the upper valvula (palea) is unknown in Gramineæ, and probably a mistake.

SECTION I. MICRATHERA.—Panicle very loose. Spikelets nearly glabrous. Awn of the flowering glume very short.

1. **D. paradoxa**, *R. Br. Prod.* 177.—Stems 2 to 3 ft. high. Leaves long and narrow, glabrous. Panicle very loose, 3 to 4 in. long, with long capillary divided branches at length spreading. Spikelets pedicellate, flat, 3- or 4-flowered, 3 to 4 lines long. Outer empty glumes rather rigid, acute, 2 to 2½ lines long. Flowering glumes shorter, very shortly hairy or pubescent below the middle, the 2 lobes shorter than the base, broad, shortly nerved, unawned. Central awn not exceeding them, somewhat flattened and brown at the base as in other species, but rarely long enough to show any twist.

**N. S. Wales.** Port Jackson, *R. Brown*. The almost glabrous spikelets have much the appearance of those of a *Poa*, but the structure is quite that of a short-awned *Danthonia*.

SECTION II. MONACHATHERA.—Panicle a raceme or very short. Flowering glumes with a broad obliquely turbinate hard base, ciliate with long hairs, the awn shorter or scarcely longer than the lobes, which are usually rigid.

2. *D. bipartita*, *F. Muell. Fragm.* i. 160.—Stems from an almost bulbous often woolly base 1 to 2 ft. high. Leaves flat but narrow, glabrous or sprinkled with long hairs. Panicle almost reduced to a simple raceme of 3 to 6 in. Spikelets few, on short erect distant pedicels, or the lower pedicels shortly branched, with 2 or 3 spikelets. Outer glumes herbaceous, many-nerved, 5 to 8 lines long, tapering into fine points. Flowering glumes 4 to 8, scarcely exceeding the outer ones, the oblique base a little more than 1 line long and broad, with a dense ring of long hairs under the lobes. Lobes narrow-lanceolate, very acute, unawned, 3 to 4 lines long, the central awn scarcely longer. Palea obtuse or truncate.—*Monachather paradoxus*, Steud. Syn. Glum. i. 247.

**N. S. Wales.** Darling River and thence to Mount Murchison, *Dallachy, Woods* and others.

**W. Australia.** *Drummond*. These western specimens are taller, with larger spikelets and fewer flowers than the eastern, but all appear to be referrible to one species.

3. *D. carphoides*, *F. Muell. Herb.*—Stems from 3 or 4 in. to 1 ft. high. Leaves very narrow, not long, glabrous. Panicle ovate, dense, 1 to  $1\frac{1}{2}$  in. long. Spikelets few, very shortly pedicellate. Outer glumes  $\frac{1}{2}$  to 5 lines long, rather broad, with scarious margins. Flowering glumes 3 to 6, with a broad oblique base as in *D. bipartita*, the ring of hairs almost broken into clusters; lateral lobes shorter than the base, the very fine awn scarcely exceeding them.

**N. S. Wales.** Macquarrie River, *C. Moore*; Armidale, *Perrott*; Cavan near Yass, *Mrs. Calvert*.

**Victoria.** Melbourne, *Adamson*.

The specimens from each locality are very few and the species requires further investigation.

SECTION III. EUDANTHONIA.—Flowering glume ovoid or oblong at the base, scarcely, oblique, ciliate with long hairs at least at the base and margins. Awn longer than the lateral lobes which are frequently scarious, except the central nerve or nerves.

*F. Mueller, Fragm.* viii. 135, proposes to unite the whole of the following species under the name of *D. penicillata*. They appear sometimes to run into each other in several respects, and the characters derived from the shape of the flowering glume and its lobes and hairs as well as the form of the palea may require further research before they can be definitely fixed, yet there certainly are several peculiar forms, which require to be distinguished at least as marked races.

4. *D. pallida*, *R. Br. Prod.* 177.—Stems 2 ft. high or more, often



rigid but not stout. Leaves long, terete when dry, very narrow and sometimes as slender as in *D. longifolia*, the sheaths more or less ciliate at the orifice. Panicle usually loosely branched, pale-coloured, 3 to 6 in. long. Spikelets rather numerous, the outer glumes under  $\frac{1}{2}$  in. long. Flowering glumes 3 or 4, not exceeding the outer ones, with long hairs on the back as well as on the margins, but scattered or in vertical lines, without the transverse ring of *D. semiannularis*; lateral lobes lanceolate, 3-nerved at the base, often scarious upwards, but the central nerve continued to the apex or produced into a point or short awn.—Trin. Spec. Gram. t. 65; Sieb. Agrostoth. n. 84, 85, 92.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*; *A. Cunningham*; *W. H.* and others; New England, *C. Stuart*; north of Bathurst, *A. Cunningham*; Shoalhaven, *C. Moore*.

**Victoria.** Barossa Range. Lower Mitta-Mitta, Forest Creek, *F. Mueller*; Riverina, *Sullivan*; Ararat, *Green*.

**Tasmania.** Ravenswood, *Bissill*.

**W. Australia.** King George's Sound, *Baxter*; Blackwood River, *Oldfield*, *Waleed*.

Var. ? *subracemosa*. Panicle narrow, very little branched. Marginal hairs of the flowering glumes copious, those on the back less so than in the typical form.—Warwick and Macleay Rivers, *Beckler*.

5. ***D. longifolia***, *R. Br. Prod.* 176.—Stems densely tufted, 1 to 2 ft. high. Leaves long and filiform, often rather rigid and curved, quite glabrous without any cilia at the orifice of the sheath. Panicle dense, pale-coloured, ovate or narrow, 3 to 4 in. long. Outer glumes exceeding the spikelet, 4 to 6 lines long. Flowering glumes 3 to 5, very short, almost covered with soft hairs the upper ones very long, the 2 lobes broad and short, usually with long awns, very fine as well as the longer central one.—Sieb. Agrostoth. n. 83.

**Queensland.** Upper Brisbane River, *F. Mueller*.

**N. S. Wales.** Port Jackson, *R. Brown*; Wellington Valley, *A. Cunningham*; New England, *C. Stuart*; Macleay River, *Beckler*.

6. ***D. robusta***, *F. Muell. in Trans. Vict. Inst.* 1855, 44, *Fragm.* viii. 136.—Stems from a thick horizontal rhizome stout, 3 to 5 ft. high. Leaves long, narrow, convolute when dry, glabrous, the upper one with a long loose sheath. Panicle dense, rather secund, 3 to 6 in. long. Spikelets pedicellate, about  $\frac{1}{2}$  in. long, 5- to 8-flowered. Outer glumes scarcely so long, the lowest rather obtuse, the 2nd tapering to a sharp point. Flowering glumes densely ciliate on the margins, with very few hairs scattered on the back, the lobes broad, tapering into short awns, the central awn long, flat and much twisted below the bend.

**Victoria.** Muryong Mountains up to the summit of Mount Kosciusko, Mount Buller, *F. Mueller*.

7. ***D. racemosa***, *R. Br. Prod.* 177.—Stems slender, 1 to 2 ft. high. Leaves very narrow, almost setaceous, glabrous or sprinkled with spreading hairs. Spikelets in the typical form singly and very shortly pedicellate or almost sessile and rather distant along the rachis of a simple raceme, but sometimes more approximate and the lower pedicels with 2 spikelets. Spikelets narrow, erect, under  $\frac{1}{2}$  in. long, the outer glumes nearly as long. Flowering glumes 6 to 8, or more in some varieties, hairy at the base and margins, glabrous or with very few hairs on the back, but the hairs variable, the marginal ones sometimes long in a dense tuft on each side of the lobes, sometimes in several distinct marginal tufts. Lateral lobes in the typical form broad with short fine points, but more awned in some varieties.

**N. S. Wales.** Port Jackson, *R. Brown*; Darling Downs and Armidale, *Herb. F. Mueller*.

Var. *obtusata*, *F. Muell.* A smaller plant. Leaves more hairy. Lateral lobes of the flowering glumes with scarcely any points.—New England, *C. Stuart*.

Var. *bivariata*. Lateral lobes of the flowering glumes broad, but with rather long points or awns.

**N. S. Wales.** Head of the Gwydir, *Leichhardt*; Bulli, *Johnstone*.

**Victoria.** Colberas, Dandenong Ranges, Curdie's River, *F. Mueller*; Ballarat, *Bacchus*.

**Tasmania.** Southport, *C. Stuart*.

**S. Australia.** St. Vincent's Gulf, *F. Mueller*.

Var. *penicillata*. Marginal hairs of the flowering glumes in several distinct tufts on each side.—*Arundo penicillata*, Labill. Pl. Nov. Holl. i. 26. t. 34 (from the figure and description); *D. Guianana*, Nees in Hook. Lond. Journ. ii. 416.—Tasmania, *C. Stuart*, *Story*, *Bissill*, *Gunn*.

Var. ? *multiflora*. Spikelets often 2 together and all approximate. Flowers rather numerous in the spikelet.—Warwick, *Bickler*; Hunter's River, *Leichhardt*; New England, *C. Stuart*; interior of S. Australia, *F. Mueller*.

8. ***D. pilosa***, *R. Br. Prod.* 177.—Stems rather slender, 1 to 2 ft. high. Leaves chiefly in radical tufts, very narrow but not so slender as in *D. setacea*, usually more or less hairy, the hairs sometimes long and spreading. Panicle narrow and dense, not much branched and sometimes almost as simple as in *D. racemosa*. Spikelets shortly pedicellate, about  $\frac{1}{2}$  in. long, the outer glumes about as long; flowering glumes 6 to 8 with lanceolate lobes tapering into fine awns almost as in *D. semiannularis*, but hairy on the margins only, without the transverse ring under the lobes of that species, and very few hairs if any on the back except at the base.—Hook. f. Fl. Tasm. ii. 120; Sieb. *Agrostoth.* n. 57.

**N. S. Wales.** Port Jackson, *R. Brown*.

**Victoria.** Black Forest, Deep Creek, *F. Mueller*; Swan Hill, *Gummon*.

**Tasmania.** Port Dalrymple, *R. Brown*; abundant throughout the island, *J. D. Hooker* and others.

**W. Australia.** Warren River and Kari Dale, *Walent*; Swan River, *Drummond*.

Some forms of the species approach in habit the *D. racemosa*, but the spikelets are

those of *D. semiannularis*, excepting in the want of the ring of hairs on the back under the lobes. A careful examination of numerous varieties and subvarieties of the three species may give more constant characters to distinguish them, or possibly to increase or reduce their number.

9. *D. semiannularis*, *R. Br. Prod.* 177.—A variable plant, the stems usually 2 to 3 ft. high, but sometimes much lower. Leaves very narrow, flat or convolute, never so fine as in *D. setacea*, the sheaths glabrous or hairy, more or less ciliate at the orifice. Panicle sometimes loose and spreading, more frequently narrow and compact. Outer glumes acute, above  $\frac{1}{2}$  in. and sometimes nearly 1 in. long. Flowering glumes usually 4 to 8, not exceeding the outer ones, the lobes lanceolate, with a broad or narrow hyaline margin, acute or tapering into a point or rather short fine awn, the long hairs or cilia copious at the base and margins and forming a ring round the back immediately under the lobes, the twisted awn varying from  $\frac{1}{2}$  to 1 in. Palea longer than the entire base of the glume, often 2-pointed.—Hook. f. *Fl. Tasm.* ii. 120; *Trin. Spec. Gram.* t. 52; *Arundo semiannularis*, Labill. *Pl. Nov. Holl.* i. 26, t. 33; *D. varia*, Nees in *Pl. Preiss.* ii. 103; *D. setacea*, Hook. f. *Fl. Tasm.* ii. 121, not of *R. Br.*; *D. eriantha*, Lindl. in *Mitch. Three Exped.* ii. 307.

**N. S. Wales.** Port Jackson, *R. Brown, C. Moore*; Blue Mountains, *C. Moore*; Lachlan and Darling Rivers, *Dallachy, Mrs. Forde* and others.

**Victoria.** Neighbourhood of Melbourne, *Adams, Harvey*; Grampians, *Sullivan*.

**Tasmania.** Port Dalrymple and Table Mountain (Mount Wellington), *R. Brown*; abundant throughout the island, *J. D. Hooker* and others.

**S. Australia.** St. Vincent's Gulf, *F. Mueller* and others.

**W. Australia.** Swan River, *Drummond, n.* 967, *Preiss, n.* 1834.

The loose-flowered form with the outer glumes dark-coloured appears to be chiefly about Port Jackson and the Blue Mountains, and occasionally in Tasmania. The common form, apparently abundant in the southern colonies, has usually a compact narrow panicle and the pale or greenish outer glumes often smooth and shining.

Var. *alpina*. Stems short and densely tufted. Leaves rather stout, convolute and very glabrous.—Summit of Mount Buller and Bogong Range at an elevation of 6000 to 7000 ft., *F. Mueller*.

*Avena bipartita*, Link. *Hort. Berol.* i. 113 (*Danthonia Linkii*, Kunth, *Enum.* i. 315), if as is supposed of Australian origin, is probably the *D. semiannularis*.

10. *D. setacea*, *R. Br. Prod.* 177.—Stems slender, tufted, frequently under 1 ft. high. Leaves setaceous, mostly short and erect in a radical tuft, but sometimes elongated, glabrous or sprinkled with spreading hairs. Panicle dense, usually narrow but branched, 1 to 2 in. long. Outer glumes much exceeding the flowering ones, 6 to 9 lines long. Flowering glumes rarely more than 6, very short with long very narrow lobes tapering into fine awns, the glume more or less hairy on the back, the marginal hairs and those round the base of the lobes very long. Palea usually shorter and more obtuse than in *D. semiannularis*.—Nees in *Pl. Preiss.* ii. 103; *D. subulata*, Hook. f. *Fl. Tasm.* ii. 121, t. 161; *D. cespitosa*, Nees, *l.c.* 104, and perhaps of Gaudichaud.



**Victoria.** Apparently common in numerous localities from the Yarra to Wilson's Promontory, *F. Mueller*, *Harvey* and others.

**Tasmania.** Port Dalrymple, *R. Brown*; Georgetown and Launceston, *Gunn*; Richmond, *Oldfield*.

**S. Australia.** Near Adelaide, *F. Mueller*.

**W. Australia.** King George's Sound, *R. Brown*, *F. Mueller* and others, and thence to Swan River, *Oldfield*, *Drummond*, n. 968, *Preiss*, n. 1834, 1859.

*D. pilosa*, Trin. Spec. Gram. t. 51 appears to me to represent rather *D. setacea* than the true *D. pilosa*. *D. cæspitosa*, Gaudich, in Duperr. Voy. Bot. 408, from Sharks' Bay, judging from the fig. and descr. in Kunth, Rev. Gram. t. 177, must come very near the weaker longer leaved forms of *D. setacea*, but with a short loose panicle and smaller spikelets. Trinius thinks it a form of *D. semiannulloris*, in which he may be right.

11. ***D. pauciflora***, *R. Br. Prod.* 177.—A small plant forming low dense branching tufts of fine rigid leaves not above 1 in. long and the stems not above 6 in. or when luxuriant both weaker and longer. Panicle ovoid, of few shortly pedicellate spikelets, sometimes reduced to 2 or 3. Outer glumes 3 lines long or rather more. Flowering glumes 3 or 4, very short, with short broad lobes acute or with short fine awns, the hairs chiefly at the base and margins not forming a transverse ring, the central awn rather longer than the lobes or lateral awns. Palea obtuse.—Hook. f. Fl. Tasm. ii. 121, t. 162.

**Tasmania.** Table Mountain (Mount Wellington), *R. Brown*; Western and other mountains, *Gunn*, *Archer*; summit of Mount Lapcyrouse, *Oldfield*; of Mount Field East, *F. Mueller*.

Var. ? *elongata*. Stem and leaves much longer than in the typical form.—Southport, *C. Stuart*.

Var. ? *alpica*, *F. Muell.* Panicle small and narrow. Glumes small, the flowering ones with very few hairs and very short awns, but with the short broad lateral lobes of the typical form.

**Victoria.** Summits of the Australian Alps, *F. Mueller*.

TRIBE VI. ASTREPTÆ.—Spikelets with several or in a few genera only 1 or 2 hermaphrodite flowers, the rachis articulate above the 2 empty usually persistent outer glumes or inarticulate, usually produced and often bearing 1 or more empty glumes above the flowers. Flowering glumes unawned or with 1 or more terminal untwisted awns. Palea not much shorter than the flowering glume, with 2 prominent nerves or keels. Stamens never more than 3. Styles usually short, with plumose stigmas.

SUBTRIBE I. PAPPOPHOREÆ.—Spikelets 1- or several-flowered in a dense compound head or in a spike or loose panicle. Flowering glumes rounded on the back, with 3 or more nerves, leading to 3 or more terminal lobes or teeth, all unawned or the central one or all tapering into untwisted awns.







## 65. AMPHIPOGON, R. Br.

(Ægopogon, Beauv. Gamelythrum, Nees.)

Spikelets 1-flowered, nearly sessile in a dense panicle contracted into a head or short spike, the rachis of the spikelet articulate above the 2 outer glumes, and not continued beyond the flower. Glumes 3, 2 outer persistent, membranous, 3-nerved, acute or tapering to an awn-like point, rarely 3-fid.; flowering glume raised on a short hairy stipes (the rachis of the spikelet), closed round the flower, deeply divided into 3 narrow lobes tapering into straight points or awns. Palea usually as long as the flowering glume, deeply divided into 2 narrow rigid lobes or awns. Styles united at the base, free upwards. Grain enclosed in the slightly hardened upper glume.—Perennial grasses with convolute terete or subulate leaves.

The genus is endemic in Australia.

Spikelike panicle oblong. Outer glumes glabrous, 3-lobed.

Stems slender, under 6 in. . . . . 1. *A. debilis*.

Spikelike panicle cylindrical or oblong, rarely shortened into an ovoid head. Outer glumes entire, rather acute

2. *A. strictus*.

Head dense, ovoid-globular.

Outer glumes hairy, with rigid points. Flowering glume nearly sessile, the awns not protruding beyond the outer glumes. Stems usually pubescent . . . . .

3. *A. laguroides*.

Outer glumes ciliate, with fine points. Flowering glume nearly sessile, the capillary awns protruding beyond the outer glumes. Stems glabrous . . . . .

4. *A. cygnorum*.

Outer glumes ciliate, with long points. Flowering glume on a long stipes, the fine awns protruding . . . . .

5. *A. turbinatus*.

1. *A. debilis*, R. Br. *Prod.* 175.—A small decumbent or tufted grass, rarely above 6 in. high, the stems and leaves almost filiform. Spikelike panicle oblong,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long. Spikelets very narrow,  $2\frac{1}{2}$  to 3 lines long. Outer glumes 3-nerved, divided to near the middle into 3 acute lobes, the central one rather rigid, the lateral ones rather shorter and thinner or almost hyaline. Flowering glume glabrous, surrounded by a tuft of hairs on the rachis or stipes, deeply divided into 3 awn-like lobes, glabrous or minutely ciliate, the lateral ones with narrow hyaline margins. Palea deeply 2-lobed.—*Ægopogon debilis*, Beauv. *Agrost.* 122.

**W. Australia.** King George's Sound, R. Brown, Baxter, also Drummond, n. 117.

F. Mueller, *Fragm.* viii. 201, unites this with *A. strictus* under the name of *A. Brownii*, but besides the habit and other characters, although the outer glumes of *A. strictus* may when old split up irregularly, they are never trifid when young as in *A. debilis*.

2. *A. strictus*, R. Br. *Prod.* 175.—Stems from a horizontal rhizome or tufted branching base erect and slender, usually above 1 ft. high. Leaves rather short, erect, subulate, glabrous. Spikelike panicle dense,

oblong or cylindrical,  $\frac{1}{2}$  to  $1\frac{1}{2}$  in. long, but little branched. Outer glumes broad, concave, faintly 3-nerved, almost scarious, entire when perfect, the outer one about 2 lines, the inner rather longer and more acute. Flowering glume on the short hairy stipes shorter than the outer glume, with 2 short rows of hairs on the back, divided into 3 rigid ciliate linear lobes or awns longer than the entire part. Palea narrow, deeply divided into 2 rigid lobes similar to those of the flowering glume. Seed separable from the membranous pericarp.—*Egopogon strictus*, Beauv. Agrost. 122; *Amphipogon caricinus*, F. Muell. in *Linnaea*, xxv. 445; *A. Brownei*, F. Muell. *Fragm.* viii. 201, partly.

**N. S. Wales.** Port Jackson, *R. Brown*, *Wells* and others; Croker's Range, *A. Cunningham*; Darling River, *Mrs. Forde*; Nambarooa Creek, *Victorian Expedition*.

**Victoria.** Glenelg River, *Robertson*; Grampians, *F. Mueller*.

**S. Australia.** Around St. Vincent's Gulf, *F. Mueller* and others; in the interior, *Babbage*, *Giles*.

**W. Australia.** Swan River, *Drummond* 1st coll., also n. 982 and 987.

Brown's typical specimens have short erect leaves and the cylindrical spike scarcely above  $\frac{1}{2}$  in. long, and a few of the Port Jackson specimens are quite like them, but most of the others pass into some of the following varieties:

Var. *gracilis*. Spike narrow with small spikelets, the awns scarcely ciliate.—*A. gracilis*, Nees in *Pl. Preiss.* ii. 101.—Callitris Plains, *Leichhardt*; York district, *W. Australia*, *Preiss*, n. 1831.

Var. *scirp.* Spike ovate or ovate-oblong, or cylindrical when young,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long. Spikelets at length larger than in the typical form, the outer glumes ciliate with rigid hairs on the margin and back.—Lofly Range, *F. Mueller*. Drummond's above-quoted *W. Australian* specimens connect this and the following variety.

Var. *avenaceus*. Leaves long. Spike 1 to  $1\frac{1}{2}$  in. long, with rather large spikelets.—*A. avenaceus*, *R. Br. Prod.* 175.—King George's Sound, *R. Brown*, and a few specimens from other localities above quoted.

Kunth, *Enum.* i. part ii. 196 describes the styles as distinct. In all the specimens I have examined I have found them united to about halfway up to the stigmas.

3. **A. laguroides**, *R. Br. Prod.* 175.—Stems rigid, rather slender, 1 to 2 ft. high, softly hairy or pubescent between the nodes or rarely glabrous. Leaves terete, rigid, glabrous. Spikelike panicle or head dense, ovoid-globular, about  $\frac{1}{2}$  in. long, usually dark-coloured. Spikelets sessile, a few of the lower ones narrow and barren. Outer glumes nearly equal, 3 to 4 lines long, membranous, lanceolate, hispid with long hairs slightly dilated at the base, tapering into fine rigid points. Flowering glume paler and thinner, shorter, slightly hairy, divided to near the middle into lanceolate lobes tapering into rigid points or awns not protruding beyond the outer glumes. Palea as long and nearly as broad, 2-lobed, with hyaline margins almost produced into additional lateral lobes. Styles very shortly united at the base.—*Egopogon laguroides*, Beauv. Agrost. 122.

**W. Australia.** King George's Sound, *R. Brown*; also *Drummond*, 1st coll.

*Pentacraspedon amphipogonoides*, Steud. *Syn. Glum.* i. 151, from King George's Sound, *Dorville*, is probably this species, distinguished chiefly by the awns being reduced to short points.







4. *A. cygnorum*, Nees in *Pl. Preiss.* ii. 100.—Rather more slender than *A. laguroides* and quite glabrous. Leaves short. Spikelike panicle or head ovoid-globular, about  $\frac{1}{2}$  in. long, pale-coloured, the fine points or awns of the glumes very prominent. Outer glumes thinly membranous, ciliate, 2 to 3 lines long, produced into rigid points or awns, that of the lowest one longer than the glume itself. Flowering glume silky-hairy, the three lobes produced into slender awn-like capillary points 2 to 3 lines long, and twice or 3 times as long as the entire base.—*A. laguroides*, F. Muell. *Fragm.* viii. 201, not of R. Br.

**W. Australia.** King George's Sound to Vasse and Swan Rivers. *Preiss.* i. 1851, *Drummond*, n. 218, 373, 392, 398, *Mrs. Molloy*, *Oldfield* and others.

5. *A. turbinatus*, R. Br. *Prod.* 175.—Stems  $1\frac{1}{2}$  to 2 ft. high, perfectly glabrous, often more leafy than in *A. laguroides*, the upper sheaths often dark-coloured and conspicuous. Spikelike panicle or head when full grown much larger than in *A. laguroides*, the spikelets dark-coloured and 4 to 5 lines long without the awns: in several specimens, however, the heads are smaller with short awns but with the spikelets apparently all barren. Outer glumes sprinkled and fringed with long hairs, tapering into rather long points. Flowering glume on a long stipes, pale-coloured, with narrow rigid lobes tapering into fine awns of 3 to 5 lines, bordered at the base by narrow hyaline margins. Styles shortly united.—F. Muell. *Fragm.* viii. 201; *Æpopogon turbinatus*, Beauv. *Agrost.* 122; *Gamelythrum turbinatum*, Nees in *Pl. Preiss.* ii. 101.

**W. Australia.** King George's Sound and neighbouring districts. R. Brown, *Drummond*, n. 298, 374, 378. *Preiss.* i. 1849, 1850, *Oldfield*, *Murvell*, F. Muell.

*Gamelythrum densiflorum*, Nees in *Pl. Preiss.* ii. 101, described from specimens with abortive spikelets only, cannot be identified by the character given.

## 66. ECHINOPOGON, Beauv.

Spikelets 1-flowered, nearly sessile in a dense panicle contracted into a head or short spike, the rhachis of the spikelet articulate above the 2 outer glumes and produced into a short bristle above the flower. Glumes 3, 2 outer persistent, acute, keeled; flowering glume thin, 5-nerved, 3-lobed, the lateral lobes unawned, the central one produced into a fine straight awn. Palea narrow. Styles distinct, the stigmas very shortly plumose. Grain enclosed in the flowering glume but free from it.

The genus is limited to the single Australian species, which extends only into New Zealand.

1. *E. ovatus*, Beauv. *Agrost.* 42, t. 9, f. 5.—An erect glabrous grass, from under 1 ft. to above 2 ft. high. Leaves flat, very scabrous, the asperities reversed on the sheath and back of the blade, erect on

the upper surface. Head or spike-like panicle on a long terminal peduncle, varying from ovoid-globular and  $\frac{1}{2}$  in. diameter to oblong-cylindrical and 2 in. long. Spikelets numerous and densely crowded, about  $1\frac{1}{2}$  lines long without the awns. Outer glumes lanceolate, boat-shaped, the keel prominent green and ciliate. Flowering glume rather broad, surrounded by a tuft of hairs, the lateral lobes very short, acute, rigid at the base, the central one shortly flat at the base, tapering to an awn of 2 to 4 lines. Palea nearly as long as the glume. Bristle continuing the axis at the back of the palea usually shorter than the glume, bearing a short tuft of hairs or rudimentary glume.—Hook. f. Fl. Tasm. ii. 117; Sieb. Agrost. n. 89; *Agrostis ovata*, Forst.; Labill. Pl. Nov. Holl. i. 19, t. 21; R. Br. Prod. 171; *Cinna ovata*, Kunth, Enum. i. 208; F. Muell. Fragm. viii. 106; *Echinopogon Sieberi*, Steud. Syn. Glum. i. 183 (from the reference to Sieber).

**Queensland.** Brisbane River, Moreton Bay, *Bailey*; head of the Gwydir River, *Leichhardt*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *Woolfs*, *C. Moore* and others; northward to New England, *C. Stuart*; Clarence, Macleay and Hastings Rivers, *Beckler* and others; southward to Illawara, *Johnstone*.

**Victoria.** Yarra River, *F. Mueller* and others; Ballarat, *Beccus*; Red Jacket Creek, *Gargurevich*.

**Tasmania,** *Labillardière*; abundant throughout the island, *J. D. Hooker*.

**S. Australia.** Lofty Range, *F. Mueller*.

**W. Australia.** *Drummond*, n. 348; Warren River, *Walcot*.

In some specimens several of the spikelets, especially in the lower part of the head, appear to contain only a male flower or to be reduced to the 2 empty glumes, the interior of the spikelet may, however, in many cases have already fallen away.

## 67. PAPPOPHORUM, Schreb.

Spikelets with one hermaphrodite flower and 1 or more male or rudimentary flowers or empty glumes above it, in a short dense and spike-like or narrow and loose panicle, the rachis of the spikelet articulate above the outer glumes and hairy round the flowering glume. Outer glumes membranous, many-nerved, awnless, as long as the spikelet. Flowering glume broad, membranous, with 9 or in species not Australian more nerves produced into more or less plumose awns. Palea 2-nerved, as long as the glume or longer. Styles distinct. Grain enclosed in the glume and palea, free from them.

Besides the Australian species, which are almost endemic, one of them extending to New Guinea, there are a few African ones of the same section, and several from America, with more numerous awns to the flowering glume.

Outer glumes 1 to 2 lines long, 5- to 9-nerved . . . . . 1. *P. nigricans*.  
Outer glumes 3 lines long 11- to 21-nerved . . . . . 2. *P. avenaceum*.

1. ***P. nigricans***, *R. Br. Prod.* 185.—Stems from under 1 ft. to  $1\frac{1}{2}$  ft. high. Leaves flat or convolute, usually narrow, sometimes quite setaceous, glabrous pubescent or villous, the nodes glabrous or bearded. Panicle dense and spike-like, varying from ovoid-oblong and under  $\frac{1}{2}$  in.





long, to narrow cylindrical and 3 in. long, or broader more branched and 2 to 3 in. long, but always dense, pale or dark coloured. Outer glumes varying from 1 to rather above 2 lines long, obtuse or acute, striate with usually 7 or 9 nerves, but sometimes especially on the lowest glume reduced to 5 and 2 of those short. Flowering glume not above 1 line long, more or less hairy outside especially at the base, with 9 fine spreading plumose awns varying from the length of the glume to twice as long. Above the flowering glume and enclosed in it is usually a similar smaller one with a male or rudimentary flower, and 1 or 2 still smaller empty ones.—*P. pallidum*, R. Br. l. c., Kunth, Rev. Gram. t. 51; *P. purpurascens* and *P. gracile*, R. Br. l. c., *P. cærulescens*, Gaudich. in Frey. Voy. Bot. 409; *P. flavescens*, Lindl. in Mitch. Trop. Austr. 34; *P. virens*, Lindl. l. c. 360; *P. commune*, F. Muell. Fragm. viii. 200.

**N. Australia.** Islands of the Gulf of Carpentaria, *R. Brown*; *Hervey*; Victoria River, *Elsey*, *F. Mueller*; Nichol Bay, and Dampier's Archipelago, *Walcott*.

**Queensland.** Broad Sound and Keppel Bay, *R. Brown*; Port Curtis, *McGillivray*; King's Creek, *Bowman*; Peak Downs, *Burkitt*.

**N. S. Wales.** Port Jackson, *R. Brown* and others. In the interior to the Darling and Murumbidgee, *A. Cunningham*, *Mitchell* and others; Liverpool plains and New England, *C. Stuart*.

**Victoria.** Portland, *Allitt*; to Snowy River, *F. Mueller*.

**S. Australia.** Spencer's Gulf, *R. Brown*; St. Vincent's Gulf to the Murray, *F. Mueller* and others; in the interior Lake Eyre, *Andrews*; Charlotte Waters, *Giles*.

**W. Australia,** King George's Sound and neighbouring districts, *A. Cunningham*, *Drummond*, n. 966, *Dempster*.

Also in New Guinea, *McGillivray*.

Evidently a very common plant and most variable in aspect, and it seems at first most difficult to unite the small slender *P. gracile*, Br., with a looser pale spike and rather narrow spikelets, with the stouter larger typical dark-coloured plant with dense cylindrical spikes, but, on going through the long series of specimens before me in different stages of development, I failed in sorting them into distinct varieties, and felt obliged to follow *F. Mueller* in regarding them all as one species, with the exception of the following about which I feel some doubts.

**2. *P. avenaceum*, Lindl. in Mitch. Trop. Austr. 320.**—Very near the *P. nigricans* with which *F. Mueller* unites it under the name of *P. commune*, and with the same habit but the spikelike panicle looser with fewer and larger spikelets. Outer glumes fully 3 lines long, with numerous nerves, usually more than 11 and sometimes as many as 21. Flowering glumes several, closely imbricate, the outer ones with a fertile flower enclosing 1 or 2 with male (or sometimes a second fertile) flowers and 1 or 2 small empty glumes.

**N. S. Wales.** Victoria (Bareool) River, *Mitchell*; Murray and Darling Rivers, *Dallachy*, *Mrs. Calvert* and others.

**Central Australia.** Lake Eyre, *Andrews*; between Alice Springs and Charlotte Waters, *Giles*.



68. *ASTREBLA*, F. Muell.

Spikelets few-flowered, sessile or nearly so in the alternate notches of the continuous rhachis of one or two simple secund spikes, the rhachis of the spikelet articulate above the 2 outer glumes. Outer empty glumes 2, glabrous, acute, many-nerved, unawned. Flowering glumes silky-hairy, 3-lobed, the central lobe with a broad base tapering into a straight or curved not twisted awn, the lateral lobes erect, rigid, 2- or 3-nerved. Palea with 2 prominent ciliate nerves or keels. Styles distinct, very short. In both species the spikes are usually single, very rarely 2 together at the end of the peduncle.

The genus is limited to Australia. It is certainly nearly allied to *Danthonia*, but the terminal untwisted awn or central lobe of the glumes places it amongst Pappophoræ, whilst the inflorescence is rather that of Chlorideæ.

Spikelets closely imbricate on one side of a secund spike of

2 to 3 in. Awn about as long as the lateral lobes . . . 1. *A. pectinata*.

Spikelets at some distance, almost erect in a secund spike of

3 to 6 in. Awn much longer than the lateral lobes, straight or hooked . . . 2. *A. triticoides*.

1. *A. pectinata*, F. Muell. *Herb.*—An erect glaucous grass of 1 to 2 ft., glabrous except sometimes a few hairs at the orifice of the sheaths. Leaves flat, ending in long points, smooth or scarcely scabrous. Spikelets sessile in the alternate notches of a secund spike of 2 to 3 in., closely imbricate and turned to one side. Outer glumes 4 to 5 lines long, glabrous, acute, 9- or 11-nerved, with scarios margins. Flowering glumes 3 or 4, the entire part scarcely 1 line long, densely villous outside as well as the broad base of the middle lobe; lateral lobes semilanceolate, glabrous, rigid, 4 to 5 lines long, acute, 2- or 3-nerved, with the outer margin broadly scarios; central lobe broad, ovate, concave, keeled, tapering into a slender straight awn about as long as or rather longer than the lateral lobes. Rhachis of the spikelet articulate only above the outer glumes, very hairy between the flowering ones, continued and less hairy above the perfect flowers with one or two glabrous glumes and paleæ empty or with rudimentary flowers.—*Danthonia pectinata*, Lindl. in Mitch. Three Exped. ii. 26.

**N. Australia.** Sturt's Creek, F. Mueller.

**Queensland.** Warrego and Curriewillighee, Dalton.

**N. S. Wales.** Darling River to the Barrier Range, *Victorian Expedition*.

**Central Australia.** Lake Eyre, Andrews.

2. *A. triticoides*, F. Muell. *Herb.*—Very near *A. pectinata*, apparently a taller plant, the leaves more or less scabrous or ciliate on the edges. Spikes 3 to 6 in. long. Spikelets alternate, not closely imbricate and often almost erect and at some distance from each other. Outer empty glumes usually very unequal, the lowest short, the 2nd 4 or 5 lines long. Flowering glumes shorter, the lateral lobes shorter and more rigid than in *A. pectinata* and the awn much exceeding them,











the dorsal hairs appressed and silky.—*Danthonia triticoides*, Lindl. in Mitch. Trop. Austr. 365.

**N. Australia.** Sturt's Creek, *F. Mueller*.

**Queensland.** Dawson River, *F. Mueller*; Curriwillighee, *L. L. L.*; Warrego, *Barton*; Flinders River, *Sutherland*; Durr River, *Dallachy*.

**N. S. Wales.** Between the Darling and Cooper's Creek, *Neilson*.

**Central Australia.** Charlotte Waters, *Giles*.

Var. *la. p. 1.* Spikelets usually thicker, the largest outer glume often  $\frac{1}{2}$  in. long. Awns of the flowering glumes usually longer than in the typical form, often bent about and some or nearly all with a rigid hook at the end but exceedingly variable; in some specimens the hook is very rare and the length of the awns very irregular. — *Danthonia lappacea*, Lindl. in Mitch. Three Exped. i. 313.—In many of the same localities as the typical form, as Sturt's and Attack Creeks, Suttor River, Warrego, Bareco, Mitchell Downs, between the Darling and Cooper's Creek, Lake Eyre, but very few specimens seen from each locality, and often at first sight unlike each other.

## 69. TRIRAPHIS, R. Br.

Spikelets several-flowered, in a terminal panicle, the rachis of the spikelet articulate above each glume, the terminal glume usually empty or with a male flower. Outer empty glumes unawned, entire or the 2nd occasionally notched with a short point in the notch. Flowering glumes with 3 narrow lobes tapering into straight awns, the central occasionally with a short lobe or point on each side, or all 3 reduced to small teeth. Palea narrow. Styles distinct. Grain enclosed in the thin or coriaceous glume and palea, free from them.

The genus is limited to Australia.

Panicle soft and dense. Flowering glumes hairy, with a pointed lobe or short awn on each side of the central awn. . . . .

1. *T. mollis*.

Panicle loose. Flowering glumes coriaceous, with 3 entire awned lobes.

Stems and leaves glabrous. Outer glumes under 2 lines long. Flowering glumes shortly silky-pubescent . . . . .

2. *T. pungens*.

Stem and leaves glabrous. Outer glumes 5 to 6 lines long. Flowering glumes fringed on the keel with a double row of short hairs . . . . .

3. *T. bromoides*.

Stem and lower leaf-sheaths woolly. Spikelet of *T. bromoides* . . . . .

4. *T. danthonioides*.

Panicle very loose. Flowering glumes coriaceous, with 3 small teeth or points . . . . .

5. *T. microdon*.

1. ***T. mollis*, R. Br. Prod. 185.**—A glabrous rather slender erect grass attaining 2 ft. but sometimes much smaller. Leaves long and narrow, ending in fine points. Panicle narrow, dense, 6 to 10 in. long, with a soft look owing to the slender awns and hairs of the glumes. Spikelets crowded on the short erect branches, narrow, about  $\frac{1}{2}$  in. long without the awns, with 8 to 10 or even more flowers. Glumes narrow, membranous, about  $1\frac{1}{2}$  lines long, the 2 outer empty ones glabrous, entire or the 2nd with a short tooth on each side of the point. Flowering glumes sprinkled with a few long hairs, the central capillary

awn 3 to 4 lines long, with a pointed lobe or short awn on each side, the lateral awns rather shorter.—*F. Muell. Fragm.* viii. 108.

**N. Australia.** Arnhem's Land, *F. Mueller*; Dampier's Archipelago, *Waleat*.

**Queensland.** Thirsty Sound, *R. Brown*; Port Curtis, *McGillivray*; Rockhampton and neighbouring districts, *O'Shanassy* and others.

**N. S. Wales.** Narran River, *Mitchell*; Darling River to Cooper's Creek, *Victorian and other Expeditions*.

**Victoria.** Wimmera, *Wilson*.

**Central Australia.** Alice Springs and M'Donnell Range, *Giles*.

**W. Australia,** *Drummond*, a single panicle in *Herb. F. Muell.*

Var. *humilis*, 6 to 8 in. high, with flattened leaves and a panicle of 2 to 3 in.—Lake Eyre, *Andrews*; north of Fowler's Bay, *Giles*.

2. ***T. pungens***, *R. Br. Prod.* 185.—A glabrous slender grass of about 2 ft., branching at the base. Leaves chiefly in the lower part, very narrow and convolute, often subulate and rigid. Panicle loose but narrow, 3 to 4 in. long. Spikelets 4 to 5 lines long without the awns. Outer empty glumes glabrous, narrow, coriaceous, 3 lines long or rather more, entire. Flowering glumes shorter below the division, coriaceous, shortly silky-pubescent, the 3 awns nearly equal, all entire and slightly dilated and rigid at the base.

**N. Australia.** Islands of the Gulf of Carpentaria, *R. Brown*; Victoria River and Sea Range, *F. Mueller*; Port Darwin, *Schultz*.

*T. diantha*, *F. Muell. Fragm.* viii. 125, from Escape Cliffs, *Hulse*, is founded on a single starved specimen, which appears to me to be a state of *T. pungens* with the spikelets reduced to 1 or 2 flowers.

3. ***T. bromoides***, *F. Muell. Fragm.* viii. 108.—A taller and stouter grass than *T. pungens*, quite glabrous. Leaves terete, erect, rigid, pungent-pointed, with rather broad sheaths. Panicle very loose but narrow, above 1 ft. long, with erect capillary branches and pedicels. Glumes narrow, coriaceous, the outer empty ones nearly  $\frac{1}{2}$  in. long, the lowest entire, acute or shortly pointed, the 2nd with a finer point and a small lobe on each side. Flowering glumes shorter below the division, the midrib fringed with a double row of short fine spreading hairs, the awns 3 to 6 lines long, rigid and dilated at the base, capillary at the end.

**W. Australia,** *Drummond*, n. 128; Murchison River and Geograph Bay, *Oldfield*.

4. ***T. danthonioides***, *F. Muell. Fragm.* viii. 125.—Taller and stouter even than *T. bromoides*, often 3 to 4 ft. high. Leaves as in that species rigid and terete, but the lower part of the stem and the lower leaf-sheaths covered with a long loose wool. Panicle very loose, often above 1 ft. long. Spikelets in some specimens as long as in *T. bromoides*, in others smaller. Outer glumes varying from 4 to 7 lines. Flowering glumes always with the double row of hairs on the midrib as in *T. bromoides*.

**W. Australia,** *Drummond*, n. 74, 207, 345.





5. **T. ? microdon**, *Benth.*—An erect glabrous grass of 2 or 3 ft. Leaves narrow, flat or convolute. Panicle very loose, with long capillary branches, bearing each 1 to 3 large flat spikelets, on capillary pedicels, at first erect, at length pendulous. Spikelets 10- to 14-flowered,  $\frac{3}{4}$  to 1 in. long, the rhachis with a tuft of short hairs under each flowering glume. Outer empty glumes narrow, acute, keeled, with or without a faint nerve on each side. Flowering glumes distant from each other, about 4 lines long, rigid with 5 very prominent nerves, of which the 3 principal ones produced into short terminal points or teeth, the central one rather the longest.

**N. S. Wales.** Blue Mountains, *C. Moore*. Munro thinks that this grass is incorrectly referred to *Triraphis*, but I can suggest no nearer affinity.

70. TRIODIA, R. Br.

Spikelets several-flowered, paniculate, the rhachis articulate above the outer glumes and between the flowering ones, hairy round them or glabrous. Glumes unawned, 2 outer empty ones acute, keeled, glabrous or the keel scabrous-ciliate. Flowering glumes usually shorter, unawned, the lower part rounded on the back, more or less 3-nerved at first, often hardened and nerveless in fruit, with 3 terminal 1- or 3-nerved lobes or teeth. Palea about as long as the entire part of the glume, with 2 prominent nerves. Ovary glabrous. Styles very short, distinct. Grain somewhat dorsally compressed, enclosed in the glume and palea, free from them.

The Australian species are all endemic, and include the troublesome prickly desert grasses, sent by early collectors with the name of "Porcupine Grass," but now more generally and disagreeably known to explorers by that of "Spinifex," totally disconnected however with the botanical genus *Spinifer*. Besides the Australian species, a common European grass and a few African ones have been referred to the genus *Triodia*.

Leaves very pungent, the sheaths usually viscid. Flowering glumes silky-ciliate, divided nearly to the middle into 3 lobes.

Panicle loose and spreading. Spikelets dark,  $\frac{1}{2}$  in. long, 8- to 12-flowered . . . . .

1. *T. Mitchelli*.

Panicle narrow and dense. Spikelets pale coloured, 3 to 4 lines long, about 6-flowered . . . . .

2. *T. pungens*.

Panicle long narrow and dense. Spikelets pale coloured, very numerous, under 3 lines long, about 3-flowered . . . . .

3. *T. Cunninghamii*.

Leaves very pungent, the sheaths not viscid. Flowering glumes silky-villous at the base, with 3 sets of 3 nerves each, leading to 3 small obtuse teeth . . . . .

4. *T. irritans*.

Leaves not pungent. Flowering glumes glabrous or nearly so, with 3 short 1-nerved acute teeth. Panicle very long.

Spikelets 3 to  $3\frac{1}{2}$  lines long, about 4-flowered.

Flowering glume almost nerveless below the teeth

5. *T. procera*.

Spikelets  $1\frac{1}{2}$  to  $2\frac{1}{2}$  lines long, 3- or 4-flowered. Nerves of the flowering glume continued below the teeth or to the base . . . . .

6. *T. microstachya*.



1. **T. Mitchelli**, *Benth.*—Leaves very nearly those of *T. pungens* but longer, nearly terete, pungent-pointed, with viscid sheaths. Panicle very much looser, 3 to 4 in. long, with capillary branches more or less spreading, the lower ones 1 to  $1\frac{1}{2}$  in. long with 3 or 4 pedicellate spikelets, the upper ones short with 1 or 2 spikelets. Spikelets dark-coloured,  $\frac{1}{2}$  in. long when fully out, ovate or oblong, with 8 to 12 flowers. Outer glumes 3-nerved, obtuse or minutely 3-toothed, about 3 lines long. Flowering glumes  $2\frac{1}{2}$  lines long, 3-nerved, the entire part densely silky-villous and at length somewhat hardened, the 3 acute rigid glabrous lobes as long as the entire part or the central one rather longer. Palea glabrous.—*T. pungens*, Lindl. in Mitch. Trop. Austr. 340, not of R. Br.

**Queensland.** On the Maranoa, *Leichhardt*; near Mount Pluto, *Mitchell*.

2. **T. pungens**, *R. Br. Prod.* 182.—A rigid scrubby more or less glutinous grass, creeping or decumbent and branching at the base, the flowering stem 1 to 2 ft. high. Leaves narrow, convolute, rigid, very acute or pungent-pointed, usually in the specimens seen 3 to 6 in. long. Panicle 3 to 6 in. long, narrow and almost spikelike, the lower erect branches rarely 1 in. long. Spikelets 3 to 4 lines long, pale-coloured, with about 6 flowers. Outer glumes glabrous, acute, under 3 lines long. Flowering glumes rather shorter, the entire base broad, with long silky hairs at the base and margins, but few on the back, hardened and almost nerveless in fruit, the 3 lobes broad, glabrous, rigid, acute, nearly as long as the entire part, and each one more or less distinctly 3-nerved in the centre. Palea as long, the 2 nerves or keels very prominent or narrowly winged.—*Festuca viscida*, F. Muell. Veg. Chath. Isl. 59, *Fragm.* viii. 129.

**N. Australia.** Islands of the Gulf of Carpentaria, *R. Brown*, *Herne*; North-west coast, *A. Cunningham*.

**N. S. Wales?** All over the N. W. interior, *A. Cunningham*, but no specimens of his with any precise station.

**Central Australia,** *Gosse*, with shorter very acute lobes to the flowering glume.

This and the preceding and following species certainly appear to be very distinct, although the form of the flowering glume is about the same in all three. But abundant as these *Triodia* are, they are said to be but rarely found in flower, and the specimens we have are too few to judge fairly of their specific relations.

3. **T. Cunninghamii**, *Benth.*—Leaves 2 ft. high or more. Leaves convolute and rigid with the sheaths more or less viscid as in *T. pungens*, but much longer, and in one specimen the lower sheaths are ciliate with long silky hairs. Panicle narrow, dense, from a few inches to 1 ft. long. Spikelets under 3 lines long, very numerous, nearly sessile on the erect branches, mostly about 3-flowered. Flowering glumes scarcely exceeding the outer ones, hairy at the base, divided to near the middle into 3 acute lobes as in *T. pungens*, but very much smaller.

**N. Australia.** Cambridge Gulf, N. W. coast, *A. Cunningham*.

**Queensland.** Sutter Desert, *F. Mueller*, apparently the same as Cunningham's plant, but only a single specimen seen.

1. ***T. irritans***, *R. Br. Prod.* 182.—A rigid scrubby glabrous grass, with long rigid convolute pungent-pointed leaves, not viscid in any of the specimens seen. Panicle narrow, almost spikelike, 3 to 6 in. long. Spikelets solitary or few together on short erect capillary pedicels or branches, mostly 3- or 4-flowered, 4 to 5 lines long. Outer glumes glabrous, acute, 5-nerved, 3 lines long. Flowering glumes not quite so long, villous with silky hairs at the base but much less so than in *T. pungens*, truncate at the end, with 3 sets of 3 nerves each leading to three very short obtuse or truncate lobes or teeth, the lateral ones rather broad, the central one smaller or minute. Palea narrow.—*Festuca irritans*, *F. Muell. Veg. Chath. Isl.* 59, *Fragm.* viii. 129.

**N. S. Wales.** Murray and Darling Deserts, *Victorian and other Expeditions*.

**Victoria.** North-west Deserts, *Lockhart Morton* and others.

**S. Australia.** South Coast, *R. Brown*; Gawler River, *Behr*; Flinders Range and Mount Remarkable, *F. Mueller*, and probably the "Porcupine Grasses" of the southern interior deserts of Australia belong generally to this species.

5. ***T. procera***, *R. Br. Prod.* 182.—Stems many feet high. Leaves long, pungent-pointed, the sheaths slightly viscid at the orifice in Mueller's specimens, less so in Brown's, with long loose sheaths, but the structure of the spikelets the same in all. Panicle rather loose but very long and narrow, attaining 1½ ft. in Brown's specimens. Spikelets 3- or 4-flowered, pale-coloured, very numerous and shortly pedicellate along the long erect branches, oblong, 2 to 3 lines long, and scarcely flattened in most specimens, but rather longer and broader when fully out. Outer glumes rather broad, acute, several-nerved, glabrous or the midrib minutely scabrous-ciliate. Flowering glumes glabrous or minutely ciliate, rigid, the nerves inconspicuous except at the end, with 3 short, acute, nearly equal prominently 1-nerved teeth.

**N. Australia.** Arnhem S. Bay, *R. Brown*; Upper Victoria River, Hooker and Sturt's Creeks, *F. Mueller*.

6. ***T. microstachya***, *R. Br. Prod.* 182.—Stems tall. Leaves long, convolute and usually pungent-pointed. Panicle very narrow, 6 in. to 1 ft. long, with very numerous small spikelets on erect slender branches, the lower branches sometimes distant, in other specimens crowded from the base, the rachis usually very scabrous. Spikelets nearly sessile, 3- to 5-flowered, 1½ to 2½ lines long. Outer glumes nearly as long as the spikelet, acutely acuminate. Flowering glumes glabrous or nearly so, obtuse with 3 short teeth, the lateral ones very obtuse, the central more acute, the 3 nerves distinct nearly to the base of the glume.—*Festuca microstachya*, *F. Muell. Veg. Chath. Isl.* 60.

**N. Australia.** Islands off Arnhem's Land, *R. Brown*; North-west coast, *A. Cunningham*; Upper Victoria River, *F. Mueller*.

STEBBIE II. CHLORIDÆ.—Spikelets 1- or several-flowered, usually small, sessile in simple secund or unilateral spikes, which are either solitary or digitate or scattered on a common rhachis. Flowering glumes usually keeled, entire and unawned or with 1, rarely 3, untwisted awns.

## 71. MICROCHLOA, R. Br.

Spikelets 1-flowered, awnless, sessile on one side of a simple slender spike, the rhachis of the spikelet articulate above the outer glumes, and not produced beyond the flower. Outer empty glumes 2, linear, membranous, nearly equal, persistent, the lowest flat with a prominent midrib, the 2nd keeled. Flowering glume shorter, broader, thin and hyaline. Palea nearly as long, narrow. Grain smooth, enclosed in the glume and palea, free from them.

The genus consists of very few species spread over the tropical and subtropical regions of the New and the Old World, the Australian species having the general range of the genus. The very thin and reduced flowering glume and palea connect it with *Andropogonæ*, but the articulation of the spikelet is above not below the outer glumes.

1. *M. setacea*, R. Br. *Prod.* 208.—Stems slender, tufted, from 3 or 4 to 8 or 9 in. high. Leaves convolute when dry and almost filiform. Spike 1 to 3 in. long, very slender and curved. Spikelets appressed to the rhachis, rather more than 1 line long. Outer glumes narrow and rather acute; flowering glume very obtuse, the edges fringed with long cilia. Palea prominently 2-nerved, the nerves very near together, ciliate with a few long hairs. Grain oblong, smooth.—Kunth, *Enum.* i. 258; *Rottboellia setacea*, Roxb. *Corom. Pl.* t. 132.

**IV. Australia.** Arnhem N. Bay, *R. Brown*. Not seen in any other Australian collection and the above character taken from Indian specimens, where it is widely spread, as well as in tropical Africa and America.

## 72. CYNODON, Pers.

Spikelets 1-flowered, awnless, singly sessile in 2 rows on one side of slender spikes, digitate at the end of the peduncle, the rhachis of the spikelet articulate immediately above the outer glumes, and either not produced beyond the flower or continued into a minute point behind the palea. Outer empty glumes 2, keeled, persistent or deciduous. Flowering glume broader, boat-shaped, with a prominent keel. Palea narrow or rather broad, the 2 nerves prominent, distant or closely contiguous. Grain smooth, enclosed in the glume and palea, but free from them.

A genus of very few species, and perhaps none really distinct besides the Australian ones. Of these one is a common weed spread over all hot countries, another











appears to be the same as an East Indian one, the two others are, as far as known, endemic.

- |   |                           |
|---|---------------------------|
| Flowering glume longer than the outer ones. Palea folded, with a small bristle or point behind it . . . . .   | 1. <i>C. dactylon</i> .   |
| Flowering glume much shorter than the outer ones, and no point behind it.   |                           |
| Flowering glume pubescent. Palea with 2 prominent distant nerves . . . . .  | 2. <i>C. tenellus</i> .   |
| Flowering glume ciliate with long hairs on the keel and margins. Palea very narrow, the 2 nerves closely contiguous, forming a ciliate keel . . . . .                             | 3. <i>C. convergens</i> . |
| Flowering glume with a horizontal ring of long spreading hairs below the point. Palea rather broad, with 2 distant nerves, and a ring of hairs like the flowering glume . . . . . | 4. <i>C. ciliaris</i> .   |

1. **C. dactylon**, Pers.; Kunth, Enum. i. 259.—Stems prostrate, often creeping and rooting to a great extent, the flowering branches shortly ascending. Leaves short, of a glaucous green. Spikes 2 to 5, often purplish, 1 to 2 in. long. Spikelets sessile, outer glumes narrow, acute, persistent, keeled, under 1 line long. Flowering glume rather above 1 line long, broadly boat-shaped, the keel usually minutely ciliate. Palea narrow. Rhachis of the spikelet produced into a point or bristle shorter than the glume, and often very minute.—R. Br. Prod. 187; F. Muell. Fragm. viii. 113; Reichb. Ic. F. Germ. t. 26; *Panicum dactylon*, Linn.; Sibth. Fl. Gr. t. 60.

**Queensland.** Port Curtis, *McGillivray*; Moreton Bay, *F. Mueller* and others; Rockhampton and neighbouring districts, *O'Shanesy*, *Thozet*, *Bowman*.

**N. S. Wales.** Port Jackson, *R. Brown* and others; New England, *C. Stuart*; Richmond River, *Mrs. Hodgkinson*; Illawarra, *J. J. J. J.*; Lord Howe's Island, *Fulagar*.

**Victoria.** Yarra River and Port Phillip to the Murray, *Robertson*, *F. Mueller* and others (very frequently with only 2 spikes).

**S. Australia.** St. Vincent's Gulf to the Murray, *F. Mueller* and others.

**W. Australia.** King George's Sound and adjoining districts, *F. Mueller*, *Oldfield*, *Preiss*, n. 1844, *Drummond*, n. 346.

Var. *pubellus*, F. Muell. Flowering glume ciliate on the keel with long hairs.—Murray River, *Dallachy*.

The species is a common and troublesome weed in all hot and some temperate countries, and although now generally spread over the settled parts of extratropical Australia, it may have been introduced with cultivation as suggested in *R. Brown*, Herb.

2. **C. tenellus**, R. Br. Prod. 187.—Stems creeping and rooting at the base as in *C. dactylon*, but usually much longer. Leaves narrow, rather long. Spikes slender, 3 to 6, digitate, 3 to 4 in. long in *Mueller's* specimens, shorter in *Brown's*. Outer glumes about 1 line long, narrow, rather obtuse, with a prominent ciliate keel. Flowering glume shorter and not broader, obtuse, pubescent, the rhachis of the spikelet not produced behind it.—*C. altior*, F. Muell. Fragm. viii. 113.

**N. Australia.** Arnhem S. Bay, *R. Brown*; Upper Victoria River, *F. Mueller*.

Kunth's plate 133 or his *Revis. Gram.* is generally quoted for this species, and the analysis at the base as well as the description in the text are quite correct, but, by some mistake of the artist, the figure itself represents a totally different plant, *Pennisetum cenchroides*.

3. ***C. convergens*, F. Muell. Fragm. viii. 113.**—A decumbent or creeping grass with the habit of *C. dactylon* or in many specimens shortly erect, apparently without stolones, glabrous except a few hairs at the orifice of the sheaths. Spikes 3 or rarely only 2, 1 to 1½ in. long, the rhachis flat and rather broad; spikelets normally in 2 rows but alternately curved inwards so as to appear almost uniseriate. Outer glumes 1½ to nearly 2 lines long, narrow, glabrous, the green keel prominent and sometimes bearing a narrow whitish wing, the glumes much less persistent than in the other species. Flowering glume about half as long, thin and hyaline, ciliate on the keel and margins with long hairs. Palea very narrow, the 2 nerves closely contiguous and almost consolidated into a single one, ciliate with long hairs, the rhachis of the spikelet not produced behind it.

**N. Australia.** Upper Victoria River, *F. Mueller*.

**N. S. Wales.** Cabramatta, *Woolfs*.

4. ***C. ciliaris*, Benth.**—A dwarf species, with the creeping habit of *C. dactylon*, the erect flowering stems 2 to 3 in. high in our specimens. Leaves short, the sheaths ciliate with long fine spreading hairs. Spikes 2, 1 to 1½ in. long, rather more rigid than in *C. convergens*. Spikelets rather smaller, converging in 2 rows on a flattened rhachis, the rhachis of the spikelet not produced above the flowering glume. Outer glumes 1½ lines long, the keel acute but scarcely winged. Flowering glume broad and very concave, much shorter than the outer ones, shortly ciliate on the keel and margins, with a transverse ring of long spreading hairs near the end. Palea not much narrower than the glume, with a similar ring of hairs, the 2 nerves not closely contiguous.

**Central Australia.** Charlotte Waters, *Giles*.

### 73. **CHLORIS**, Linn.

Spikelets 1-flowered, awned, singly sessile in 2 rows on one side of simple spikes, either solitary or digitate at the end of the peduncle, the rhachis of the spikelet articulate immediately above the outer glumes. Outer empty glumes 2, keeled, persistent, awnless. Flowering glume produced into a fine straight awn, entire or with a tooth lobe or short awn on each side of the terminal awn. Palea folded or with 2 prominent nerves. Rhachis of the spikelet produced behind the palea and bearing 1 or more empty glumes, all awned and usually with their ends on a level with that of the flowering glume.

A rather large genus, widely spread over the warmer regions of the globe. Of the nine Australian species one only has been satisfactorily matched with a common







Asiatic and African one, another comes near to an Indian species, the remainder are all endemic.

- Spike solitary, slender. Flowering glume narrow . . . . . 1. *C. unispicea*.  
 Spikes digitate, slender. Spikelets acute. Flowering glume usually with a tooth lobe or short awn on each side of the terminal one.  
 Spikes few, about 1 in. long. Lobes of the flowering glume awned . . . . . 2. *C. pumilio*.  
 Spikes numerous, 2 to 3 in. long. Spikelets closely approximate and regularly pectinate. Flowering glume 2-fid, unawned, usually scabrous . . . . . 3. *C. pectinata*.  
 Spikes 6 to 12 or more, 3 to 6 in. long.  
 Spikelets rather crowded, 2 lines long. Flowering glume with a fine tooth or point on each side of the awn . . . . . 4. *C. divaricata*.  
 Spikelets distant, 3 lines long. Flowering glume tapering into the awn or very minutely toothed . . . . . 5. *C. acicularis*.  
 Spikes digitate, slender, 3 to 6 in. long. Spikelets very obtuse or truncate.  
 Spikelets cuneate, truncate, 1 to 1½ lines long. Flowering glume oblong, obtuse. Upper empty one broad, truncate . . . . . 6. *C. truncata*.  
 Spikelets very obtuse, 1½ to 2 lines. Flowering glume very broad, embracing the narrower empty one . . . . . 7. *C. ventricosa*.  
 Spikes digitate, dense, 1 to 2 in. long.  
 Flowering glume membranous, rather acute. Upper empty glume solitary, truncate . . . . . 8. *C. barbata*.  
 Flowering glume broad, rigidly scarious, ciliate. Upper empty glumes several, broad, scarious, very spreading . . . . . 9. *C. scariosa*.

1. ***C. unispicea*, F. Muell. Fragm. vii. 118.**—A slender grass, from 6 in. to above 1 ft. high, glabrous except long hairs at the orifice of the sheath, branching at the base and densely tufted. Leaves short, setaceous, crowded at the base of the stem, the upper ones few and capillary. Spike single, erect, unilateral, 1½ to 4 in. long. Outer glumes very narrow, hyaline, acuminate, the lowest about 1½ lines, the 2nd at least 2 lines long. Flowering glume on a hairy stipes, narrow, thin, faintly 3-nerved, tapering at the top, nearly as long as the outer glume, entire, with a fine awn of 2 to 3 lines. Terminal empty glume narrow, with a fine awn sometimes as long as, sometimes much shorter than that of the flowering glume.

**Queensland.** Herbert's Creek, Bowman.

2. ***C. pumilio*, R. Br. Prod. 186.**—A small glabrous grass, our specimens 4 to 8 in. high, with the foliage of a *Cynodon*. Spikes 3 to 5, about 1 in. long. Spikelets narrow and crowded but all turned to one side, about 2 lines long without the awn. Outer glumes very narrow, fine-pointed, the longest scarcely 1 line long. Flowering glume lanceolate, scarcely ciliate, deeply divided into 2 narrow lanceolate lobes produced into awns either very short or nearly as long as the central one which varies from 1½ to 4 lines long. Terminal empty glumes 2 or 3, lanceolate and awned.

**N. Australia.** Islands off the north coast, *R. Brown*; Norman River, *Galliver*.

3. *C. pectinata*, *Benth.*—Stems 1 to 1½ ft. high, with the flat leaves and loose sheaths of *C. barbata*. Spikes 7 to 14, 2 to 3 in. long, the spikelets very numerous, narrow, elegantly arranged in a single dense row. Outer glumes very narrow, almost subulate. Flowering glume very narrow, smooth or scabrous, scarcely ciliate, with 2 narrow lobes acute or produced into very short points, the intermediate almost dorsal awn very fine, 3 to 4 lines long. Terminal empty glume bilid, with a dorsal awn.

**Queensland.** Cashmere, *Amitt.* with purple awns and rather smaller awns.

**Central Australia.** Charlotte Waters, *Giles*, with pale-coloured awns.

The species is intermediate as it were between *C. pumilio* and *C. divaricata*.

4. *C. divaricata*, *R. Br. Prod.* 186.—A glabrous erect tufted grass of 1 to 2 ft. Leaves narrow, flat or convolute, the sheaths often much flattened. Spikes 6 to 12, slender, 3 to 6 in. long. Spikelets very numerous but not crowded, rarely 2 lines long without the awns. Outer glumes unequal, very narrow, finely pointed. Flowering glume narrow, keeled, 3-nerved, the fine awn 3 to 6 lines long, with a point or narrow lobe on each side. Terminal empty glume broadly linear, 2-lobed, with an awn between the lobes sometimes as long as that of the flowering glume.

**N. Australia.** Sturt's Creek, *F. Mueller* (a tall form with long awns).

**Queensland.** Keppel and Shoalwater Bays and Broad Sound, *R. Brown*; Rockhampton and neighbouring districts, *Burnett*, *Thwait*, *O'Shaugh* and others; Moreton Bay, *C. Stuart*.

5. *C. acicularis*, *Lindl. in Mitch. Trop. Austr.* 33.—A glabrous erect grass of 1 to 2 ft. Leaves flat, the lower sheaths broad and flattened. Spikes 6 to 12 or even more, at first erect but at length horizontally spreading as in *C. divaricata*, 3 to 4 in. long, slender and often purplish. Spikelets rather distant. Outer glumes narrow, keeled, tapering to fine points, the lowest 1½ to 2 lines, the 2nd 3 lines long. Flowering glume about 2 lines, narrow, 3-nerved, tapering into an awn of about ½ in., with sometimes but not always a short point on each side at the base. Palea long, narrow, prominently 2-nerved. Terminal empty glume with an awn sometimes as long as that of the flowering glume but usually shorter.—*C. Moorei*, *F. Muell. in Linnea*, xxv. 444.

**N. S. Wales.** In the interior, *Mitchell*; Armadillo, *Barton*; Murray and Darling Rivers to the Western frontier, *Victorian* and other expeditions; also in *Leichhardt's* collection.

**S. Australia.** Head of St. Vincent's Gulf and Murray River, *F. Mueller*; near Lake Eyre, *Andrews*; Alice Springs and Charlotte Waters, *Giles*.

**W. Australia.** Fraser's Range, *Dempster*.

Nearly allied to but appears distinct from the E. Indian *C. Roeburghiana*, *Edgew.*

6. *C. truncata*, *R. Br. Prod.* 186.—A glabrous erect grass of 1 to 3 ft. Leaves usually flat but narrow, with flattened sheaths. Spikes

6 to 10, slender, 3 to 6 in. long, at length horizontally spreading. Spikelets numerous but not crowded, cuneate, 1 to  $1\frac{1}{2}$  lines long without the awns. Lowest outer glume very small, almost setaceous, the 2nd narrow and fine pointed, about as long as the spikelet. Flowering glume oblong, obtuse, keeled, slightly ciliate, with a fine awn of 3 to 6 lines. Terminal empty glume much shorter and broader, raised to the level of the flowering glume and flat-topped, giving the spikelet its cuneate truncate form.—Kunth, *Rev. Gram.* t. 178.

**Queensland.** Condamine River and Bokhara Flats, *Leichhardt*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown* and others; abundant in the West Interior, *A. Cunningham* and many others; New England, *C. Stuart*; Hastings and Clarence Rivers, *Beckler* and others.

**S. Australia.** St. Vincent's Gulf, *F. Mueller*.

Specimens from Darling River in Herb. F. Mueller have denser spikes not exceeding 2 in. in length, but do not otherwise differ from the typical ones. The species has been long in cultivation in Continental Botanic Gardens, and has appeared as a weed in kitchen gardens at Constantinople, and is known as *C. elongata*, Poir., and *C. dolichostachya*, Lag., and described by Trinius, *Gram. Unifl.* 285, under the latter name partly from garden, partly from Port Jackson specimens. Poiret described his *C. elongata* from a Timor specimen. Lagasea gives the Philippines as the station for *C. dolichostachya*. We have no specimen from either locality, and the diagnoses neither of Poiret nor of Lagasea are sufficient for identification, but, as far as they go, apply well to the plant.

7. *C. ventricosa*, *R. Br. Prod.* 186.—Usually rather taller than *C. truncata*, often above 2 ft. high, with few flat leaves. Spikes 5 to 7 in the typical specimens, 3 to 4 in. long. Spikelets cuneate and obtuse as in *C. truncata*, but larger, from  $1\frac{1}{2}$  to 2 lines long, and often but not always dark-coloured. Flowering glume broad, very obtuse, embracing the much smaller terminal one, which is raised and truncate as in *C. truncata*, usually emarginate, the awns of both much shorter than the spikelet.—*C. sclerantha*, Lindl. in *Mitch. Trop. Austr.* 31.

**Queensland.** Bokhara Flats, *Leichhardt*; Bowen Downs, *Birch*.

**N. S. Wales.** Richmond, *R. Brown*; Armadillo, *Barton*; Western interior, *A. Cunningham*; Bogan River, *Mitchell*.

**Var. tenuis.** Stems 1 to  $1\frac{1}{2}$  ft. high. Leaves short and narrow. Spikes 3 to 5, about 2 in. long. Spikelets smaller with longer awns, but with the broad flowering glume embracing the barren terminal one as in the typical form.—Rockhampton, *O'Shanesy*; Nerkoool Creek, *Bowman*.

Another long-awned form has spikes of 3 to 4 in., from Cabramatta and Ash Island, *Woolfs*; Bowen Downs, *Birch*.

8. *C. barbata*, *Sw.*; *Kunth, Enum.* i. 264, *var. decora*.—A glabrous grass with flat leaves and loose leaf-sheaths, closely resembling the common *C. barbata*, but the spikes dense, the awns longer and only one terminal empty glume instead of the two of the typical form. Spikes 6 to 10,  $1\frac{1}{2}$  to 2 in. long. Outer glumes 1 to  $1\frac{1}{2}$  lines long, narrow, thin and hyaline, the 2nd keeled and tapering into a fine point.



Flowering glume not broad, membranous, keeled, ciliate at the end with long hairs and slightly so on the margins, rather acute, sometimes notched, the awn very fine, 3 to 4 lines long. Terminal empty glume very obtuse or truncate, slightly emarginate, the awn nearly as long as that of the flowering glume.—*C. decora*, Nees in Steud. Syn. Glum. i. 205.

**Central Australia**, *Goss*; Stephenson's River, *McDowell Street* (single specimens in Herb. F. Mueller).

The species is a widely spread tropical one, though usually with 2 empty glumes above the flowering one, the above quoted *C. decora*, Nees, however, from East India, scarcely differs from the Australian variety in its rather shorter awns. A S. African plant, apparently the same as the *C. compressa*, DC., described from garden specimens, exactly resembles the Australian one, except that the leaves are ciliate with long hairs of which there is no trace in the var. *decora*.

9. ***C. scariosa*, F. Muell. Fregm. vi. 85.**—Stems erect, slender but rigid, 1 to 2 ft. high. Leaves narrow with subulate points or almost entirely flat in the larger specimens, glabrous. Spikes 4 to 6, dense, 1 to 1½ in. long. Spikelets sessile, 3 to 4 lines long. Lowest glume narrow, hyaline, almost obtuse, scarcely keeled, about 2 lines long, the 2nd rather longer with a more prominent keel. Flowering glume raised on a hairy rhachis of about 1 line, rather above 1 line long, very broad and concave, prominently 3-nerved, ciliate with long hairs at the end, with a fine awn of 2 to 3 lines. Terminal empty glumes several (4 to 7), the lowest two broader than the flowering one, 5- to 7-nerved at the base, hyaline and not ciliate, very spreading and at length rigidly scarious, the upper ones gradually smaller sessile and not exceeding the outer ones.

**N. Australia.** Sturt's Creek, *F. Mueller*.

**Queensland.** Rockhampton, *W. S. Goss*; Gracemere, *Borner*; Bowen Downs, *Birch*.

There are one or two East Indian species with broad scarious empty glumes, but they do not exactly correspond with the Australian one.

## 74. ELEUSINE, Gærtn.

(*Dactyloctenium*, Willd. *Acrachne*, Nees.)

Spikelets several-flowered, flat, imbricate in 2 rows along one side of the digitate or scattered branches of a simple panicle, the rhachis of the spikelet articulate above the outer glumes. Glumes spreading, keeled and complicate, thin but rigid, the 2 outer empty ones usually shorter, unequal, obtuse, acute or tapering to a short point. Flowering glumes obtuse or less pointed, the terminal one usually empty or rudimentary. Palea folded. Styles short, distinct. Seed rugose within a loose membranous pericarp, which either persists round the







ripe seed or breaks up and falls away or otherwise disappears as the ovary enlarges.

A small widely spread tropical genus. Of the three Australian species two are common weeds in warm countries, the third extends over tropical Asia and Africa.

Spikes digitate, short. Spikelets very closely packed, the glumes very pointed, the 2nd outer one almost awned.

Pericarp evanescent . . . . . 1. *E. ægyptiaca*.

Spikes digitate or with one lower down, 2 to 3 in. long.

Glumes obtuse. Pericarp persistent . . . . . 2. *E. indica*.

Spikes 6 to 12, scattered or the upper ones digitate. Glumes pointed, the flowering ones with a small tooth on each side of the point. Pericarp evanescent. . . . . 3. *E. verticillata*.

1. *E. ægyptiaca*, Pers. *Syn.* i. 82.—Stems tufted or creeping and rooting at the base and shortly ascending like the *Cynodon dactylon*, or rarely above 1 ft. high. Leaves flat, ciliate, flaccid, with long points. Spikes usually 3 to 5, digitate, under  $\frac{1}{2}$  in. in most of the Australian specimens but sometimes 1 in. long, the angular rhachis prominent on the upper or inner side, the spikelets regularly and very closely packed at right angles to it on the opposite side. Outer glume about 1 line long, acute, the 2nd broader, obtuse or emarginate, the keel produced into a short dorsal awn, the rhachis of the spikelet produced above the outer glumes but glabrous. Flowering glumes broad, complicate, tapering into short spreading points. Pericarp loose over the enlarged ovary, disappearing from the ripe rugose seed.—Pluk. *Almag.* t. 300, f. 8; *Cynosurus ægyptius*, Linn. *Spec.* 106; *Dactyloctenium ægyptiacum*, Willd.; Kunth, *Enum.* i. 261; *Eleusine cruciata*, Lam.; F. Muell. *Fragm.* viii. 111; *E. radicans*, R. Br. *Prod.* 186; *Dactyloctenium radicans*, Beauv.; Kunth, *Enum.* i. 262.

**N. Australia.** Gulf of Carpentaria, R. Brown, *Gleaner*; Sir Charles Hardy's Island, *Hume*; Port Essington, *Amstrong*; Victoria River, F. Muell.; Dampier's Archipelago, *Walcot*.

**Queensland.** Beby Island, *Banks and Solander*; Rockingham Bay, *Dalla Torre*; Herbert's and Nerakool Creeks, *Banks*; Graemore, *O'Shaughnessy*; Balakool River, *Lockyer*; Barcoo, *Schneider*.

**N. S. Wales.** Darling River and Maranoa, *Woolfs*.

**Central Australia.** Near Lake Eyre, *Andrews, Giles*.

A common weed of warm countries.

2. *E. indica*, *Gartn.*; *Kunth, Enum.* i. 272.—A coarse erect tufted grass 1 to 2 ft. high. Leaves narrow, the sheaths flattened and distichous, ciliate with a few long hairs. Spikes 5 to 7, 2 to 3 in. long, digitate, with usually one inserted rather lower down, the rhachis prominent on the upper or inner side, the spikelets loosely imbricate on the opposite side. Each spikelet  $1\frac{1}{2}$  to 2 lines long, containing 3 to 5 flowers. Glumes obtuse, the lowest small and 1-nerved, the 2nd empty one and the lower flowering ones usually 3-nerved. Pericarp persistent, very loose and membranous, enclosing the rugose seed.—

Trin. Spec. Gram. t. 71; F. Muell. Fragm. viii. 112; *E. marginata*, Lindl. in. Mitch. Three Exped. i. 319.

**Queensland.** Moreton Bay, *Leichhardt, Bailey*; Rockhampton, *O'Shaunessy, Thozet*; Nerikool Creek, *Bowman*.

**N. S. Wales.** Tweed River, *C. Moore, Eaves*.

A common tropical and subtropical weed.

**3. *E. verticillata*, Roxb.; Fl. Ind. ed. Car. et Wall. i. 346.**—An erect annual of 1 to 1½ ft., with the habit of *E. indica*. Leaves flat, with loose flattened sheaths. Spikes or panicle-branches 6 to 12 or even more, varying from 1 to 3 in. long, the lower ones distant or verticillate, the upper ones almost digitate. Spikelets 2 to 3 lines long, 8- to 12-flowered. Outer empty glumes small and narrow, the lowest almost subulate, the 2nd lanceolate, keeled, with a fine point. Flowering glumes rather above 1 line long, broad and 3-nerved, the keel produced into a short point, the lateral nerves ending usually in a small tooth on each side of the point. Pericarp loose over the enlarged ovary, disappearing from the rugose seed.—F. Muell. Fragm. viii. 112; *E. racemosa*, Roth, Nov. Sp. Pl. 80; *Leptochloa verticillata* and *L. racemosa*, Kunth, Enum. i. 272; *Acrachne eleusinoides*, Nees in Herb. Wight, n. 118 and 1760.

**N. Australia.** Dampier's Archipelago and Exmouth Gulf, *Walcott*.

**Queensland.** Bowen River, *Bowman*.

Widely spread over tropical Asia and Africa.

## 75. LEPTOCHLOA, Beauv.

Spikelets several-flowered or rarely 1-flowered, sessile in 2 rows along one side of the slender usually numerous branches of a simple panicle, the rhachis of the spikelet articulate above the outer glumes and more or less produced above the flowering ones. Glumes keeled, acute or obtuse, unawned, the 2 outer empty ones shorter or rarely as long as the flowering ones. Palea prominently 2-nerved or folded. Grain smooth or nearly so, the pericarp very thin and adnate.

The genus is generally spread over tropical and subtropical regions both in the New and the Old World. Of the three Australian species two are also East Indian, the other is endemic. They have been placed the one in *Cynodon*, the two others in *Poa*, differing from both genera more in inflorescence than in the structure of the spikelets.

Spikelets 5- or 6-flowered. Flowering glumes rather obtuse.

Spikes dense, mostly crowded at the end of the rhachis . . . 1. *L. subligitata*.

Spikes slender, scattered along the long slender rhachis . . . 2. *L. chinensis*.

Spikelets 1-flowered. Flowering glumes acute. Spikes

slender, scattered along the long slender rhachis . . . 3. *L. polystachya*.







1. **L. subdigitata**, Trin. in Steud. Syn. Glum. i. 210.—An erect rigid usually glaucous grass, attaining 4 or 5 ft. Leaves short, with rigid rather loose sheaths. Spikes or panicle-branches 6 to 10, crowded at the end of the peduncle with usually 1 or 2 lower down, 2 to 4 in. long. Spikelets  $1\frac{1}{2}$  or rarely 2 lines long, 5- or 6-flowered, the rhachis bearing a few short hairs under each glume. Glumes about  $\frac{1}{2}$  line long, obtuse or almost acute, the outer empty ones usually rather smaller, especially the lowest. Palea folded. Grain oblong, perfectly smooth, the pericarp very thin and adnate.—*Poa digitata*, R. Br. Prod. 182; *Eleusine digitata*, Spreng. Syst. Cur. Post. 36; F. Muell. Fragm. viii. 112; *E. polystachya*, F. Muell. Fragm. i. 216.

**N. Australia.** Sturt's Creek, F. Mueller; Upper Murchison and Warren Rivers, Walcott.

**Queensland.** Suttor River, F. Mueller; Gracemere, O'Shaughnessy; Darling Downs, Law.

**N. S. Wales.** Glendon and Cassilis, Leichhardt; Armadillo, Barton; Lachlan River, Fraser; Castlereagh River, Woolls; Darling River to Cooper's Creek, Neilson.

**Central Australia.** McDonnell Ranges, Giles.

**W. Australia.** Upper Murchison and Warren Rivers, Walcott.

2. **L. chinensis**, Nees; Steud. Syn. Glum. i. 209.—Stems from a creeping and rooting base ascending to 2 or 3 ft., glabrous and usually slender. Leaves narrow, flat, tapering to a point. Panicle 6 in. to above 1 ft. long, the numerous simple branches scattered or clustered along the rhachis, very slender, 2 to 4 in. long, or in the smaller weaker specimens under 2 in. Spikelets sessile or nearly so, distant or rather crowded, narrow, 1 to 2 lines long, usually 4- to 6-flowered. Outer empty glumes rather unequal, acute, flowering ones broader, obtuse.—*Poa chinensis*, Kœn.; F. Muell. Fragm. viii. 132; *Leptochloa tenerrima*, Roem. and Schult.; Kunth, Enum. i. 270; *Poa decipiens*, R. Br. Prod. 181; *Eragrostis decipiens*, Steud. Syn. Glum. i. 279.

**Queensland.** Keppel Bay, R. Brown; Brisbane River, Moreton Bay, Leichhardt, C. Stuart, Bailey; Bokhara Flats, Leichhardt; Rockhampton and neighbouring districts, Bowman, O'Shaughnessy.

**N. S. Wales.** New England, C. Stuart.

Generally spread over East India and Eastern Asia. It varies considerably in the spikelets sometimes scarcely above 1 line long and distant, in other specimens about 2 lines long and more approximate, and in the palea glabrous or ciliate on the keels.

*Poa imbecilla*, R. Br. Prod. 181 (*P. asthenes*, Roem. and Schult. Syst. ii. 574; *Eragrostis imbecilla*, Steud. Syn. Glum. i. 279), from Bread Sound, R. Brown, is different from the *P. imbecilla*, Labill. and appears to be merely a weak slender variety of *Leptochloa chinensis*, with few distant spikes to the panicle.

3. **L. polystachya**, Benth.—An erect grass of 3 ft. or more, the lower nodes sometimes bearded, otherwise glabrous and glaucous. Leaves convolute with subulate points and rather loose sheaths, the lower ones flat. Spikes very numerous and slender, 1 to 2 in. long,

crowded in a long narrow simple panicle of 8 to 10 in., the common rhachis slightly flattened and striate. Spikelets 1-flowered, nearly sessile. Outer glumes  $\frac{1}{2}$  to nearly 1 line long, acute, with a prominent glabrous or slightly ciliate keel. Flowering glume rather shorter, glabrous or minutely pubescent. Palea prominently 2-nerved, rhachis produced behind it into a minute point, sometimes quite obsolete, sometimes according to F. Mueller bearing an empty glume. Grain oblong, smooth, the pericarp not distinguishable when ripe.—*Cynodon polystachyus*, R. Br. Prod. 187; F. Muell. Fragm. viii. 113. *C. virgatus*, Nees in Steud. Syn. Glum. i. 213; *C. Neesii*, Thw. Enum. Pl. Ceyl. 371.

**N. Australia.** Islands of the Gulf of Carpentaria, *R. Brown*; Victoria River, *F. Mueller*; Etheridge and Gilbert Rivers, *Sullivan*.

**Queensland.** Burdekin River, *Bowman*.

Also in Ceylon and in the E. Indian Peninsula. I have been able to retain Brown's specific name, as the American *Diplachne parietalis*, named *Leptochloa polystachya* by Kunth, is generally retained under the former genus. Our species has been usually placed in *Cynodon*, on account of the 1-flowered spikelets, but the numerous spikes crowded on the long rhachis of the panicle give the plant a very different aspect from that of the digitate *Cynodon*, and there are one or two other species of *Leptochloa*, in which the flowers are occasionally or constantly reduced to a single one.

## 76. DIPLACHNE, Beauv.

Spikelets several- often many-flowered, linear, sessile or very shortly pedicellate, but distant along the rhachis of a simple spike or of the elongated branches of a simple panicle, the rhachis of the spikelet articulate and usually hairy under the flowering glumes. Outer empty glumes keeled, acute, unawned; flowering glumes with a hyaline shortly 2-lobed apex, the keel produced into a short point or awn between or shortly below the lobes. Palea thin, prominently 2-nerved. Styles short, distinct. Grain smooth, free.

A genus of few species, generally spread over the warmer regions of the globe. Of the four Australian species one has a wide range in the Old World, and is probably the same as an American one, another is closely allied to if not identical with an Indian one, the two others appear to be endemic.

Spike slender, simple . . . . . 1. *D. loliiformis*.

Spikes numerous in a simple panicle.

Spikelets pale-coloured, 5-8 lines long, 8- to 12-flowered.

Rhachis with a tuft of long hairs under the glumes . . . . . 2. *D. Muelleri*.

Spikelets usually dark-coloured, 4 lines long or rather more, with more than 6 flowers, rhachis glabrous, or nearly so . . . . . 3. *D. fusca*.

Spikelets light-coloured, scarcely 3 lines long, with usually 5 or 6 flowers . . . . . 4. *D. parviflora*.

1. ***D. loliiformis***, *F. Muell.*—A slender apparently annual erect grass, usually 6 to 8 in. but a few specimens above 1 ft. high. Leaves





chiefly at the base, short and narrow, usually sprinkled with a few long hairs, the sheaths ciliate at the orifice, with a short jagged ligula. Spike slender and simple, 2 to 4 in. long, on a long peduncle. Spikelets sessile, rather distant, erect and appressed, turned somewhat to one side, narrow, 3 to 4 lines long, 6- to 12-flowered, the rhachis hairy round the flowering glumes. Flowering glumes about 1 line long, glabrous, 3-nerved, the central nerve produced into a fine point or awn shortly exceeding the hyaline lobes.—*Festuca* or *Leptochloa loliiformis*, F. Muell. Fragm. viii. 128.

**Queensland.** Moreton Bay and Charley's Creek, *Leichhardt*; various localities about Rockhampton, *Bowman*, *O'Shanesy*.

**Central Australia.** Between Alice Springs and Charlotte Waters, *Giles*, the specimens rather more robust.

The species is closely allied to an apparently unpublished East Indian one.

2. **D. Muelleri**, *Benth.*—A glabrous erect grass of about  $1\frac{1}{2}$  ft. nearly allied to *D. fusca*, with a similar foliage and inflorescence, but the spikelets fewer, pale-coloured, 5 to 8 lines long, with 8 to 12 flowers. Flowering glumes surrounded by a tuft of rather long hairs and the margins ciliate below the middle, the point of the keel scarcely exceeding the hyaline margins, and the lateral nerves occasionally produced into minute points. Grain narrow-obovate, flattened.

**N. Australia.** Sturt's Creek, *F. Mueller*.

**Central Australia.** Charlotte Waters, *Giles*.

3. **D. fusca**, *Beauv. Agrost.* 163.—A glabrous erect grass of several feet. Leaves narrow, convolute when dry, with long loose sheaths, the ligula jagged. Panicle narrow, 6 in. to 1 ft. long, with erect branches, the lower ones long. Spikelets sessile or nearly so, rather distant, erect, linear, 6- to 10-flowered, about 4 lines long or rather more and straw-coloured, or longer and dark, the rhachis glabrous or slightly hairy under each glume. Flowering glumes nearly 2 lines long, shortly ciliate on the margins in the lower part, prominently 3-nerved, the keel produced into a short point between or just below the short hyaline terminal lobes. Keels of the palea shortly ciliate.—*Festuca fusca*, Linn.; F. Muell. Fragm. viii. 127; *Leptochloa fusca*, Kunth, Enum. i. 271; *Triodia ambigua*, R. Br. Prod. 183; *Uralepis fusca* and *U. Drummondii*, Steud. Syn. Glum. i. 247.

**N. Australia.** Victoria River, *F. Mueller*.

**Queensland.** Keppel Bay, *R. Brown*; Bokhara Flats, *Leichhardt*.

**N. S. Wales.** Lachlan River, *A. Cunningham*; Darling River, *Mrs. Forde*.

**Central Australia.** Lake Eyre, *Andrews*.

**W. Australia.** Drummond, n. 388.

F. Mueller appears to be right in identifying this with a widely spread African species, which is also in East India and is very little different from the original American *D. fascicularis*.



4. *D. parviflora*, *Benth.*—A glabrous erect grass of 2 or 3 ft. Leaves convolute, with long rather loose sheaths, the ligula jagged. Panicle narrow, dense, varying from 3 to 10 in., with long erect simple branches. Spikelets very numerous, sessile or nearly so, 3 to 4 lines long, very narrow, 5- to 7-flowered. Outer glumes about  $1\frac{1}{2}$  lines long. Flowering glumes rather shorter, glabrous on the back, the margins ciliate, the lateral nerves scarcely distinct, the keel produced into a short point, the lateral hyaline lobes adnate to it almost to the top.—*Triodia parviflora*, R. Br. Prod. 182; *Festuca Brownii*, F. Muell. Fragm. viii. 129.

**N. Australia.** Arnhem S. Bay, *R. Brown*; North West Coast, *Hughes*. With the latter specimens are some short barren stems with short spreading rigid leaves, but they may not belong to the same species, as the sheaths are slightly viscid and there is no jagged ligula.

SUBTRIBE III. MILIEÆ.—Spikelets 1- or 2-flowered, usually small in a loose or narrow and dense panicle, the rhachis of the spikelet not produced beyond the upper flower. Outer glumes usually broad and several-nerved or almost nerveless, unawned. Flowering glumes nearly similar, unawned or with one untwisted awn. Palea often as large as the glume. Grain free.

The genera here collected, together with *Milium* and a few others not Australian, appear to me to form a fairly limited and not unnatural group. They have been generally dispersed in Paniceæ, Agrestidæ, and Festucæ, but they have neither the articulate pedicel of the first, nor the twisted awn and reduced palea of the second, nor the terminal bristle or empty glume so general in Festucæ.

## 77. SPOROBOLUS, R. Br.

(*Vilfa*, *Beauv.*)

Spikelets small, 1-flowered, nearly sessile or pedicellate in a narrow spikelike or loose and pyramidal panicle, the rhachis of the spikelet very short, glabrous, scarcely articulate, not continued beyond the flower. Glumes 3, persistent or separately deciduous, unawned, slightly keeled or convex and obscurely nerved, 2 outer empty ones usually unequal; flowering glume as long or longer. Palea about as long as the glume, with 2 nerves usually prominent, and readily splitting between them. Styles very short. Grain free, readily falling away from the glume, the pericarp loosely enclosing the seed or very thin and evanescent.

The genus is widely spread over the tropical and some more temperate regions of both the New and the Old World. Of the six Australian species, two have a general range over the area of the genus, a third extends over East India, the three others appear to be endemic, but come very near to some Asiatic species.

Beauvois, and after him Trinius, have replaced Brown's name *Sporobolus* by *Vilfa* of Adamson, on the ground of priority, but Adamson's character is far too vague to be recognised as generic, and of the two species of Caspar Bauhin's which he refers







to, p. 618 of his "Familles." one is said by Bauhin to be a common weed of cultivation in Germany, Belgium and England, the other a very tall European aquatic or marsh grass with a large panicle. Neither therefore can well be congeners of Brown's *Sporobolus*.

Panicle narrow, spikelike, continuous or interrupted, the short erect branches flowering from the base.

Outer and flowering glumes nearly equal. Leaves usually short rigid and spreading . . . . .

1. *S. virginicus*.

Outer glumes unequal, shorter than the flowering one.

Leaves rather long . . . . .

2. *S. indicus*.

Panicle narrow, loose, with short spreading scattered branches . . . . .

3. *S. diander*.

Panicle loosely pyramidal, the branches spreading in regular distant whorls.

Spikelets loosely pedicellate, minute.

Leaves rigidly ciliate. Glumes obtuse . . . . .

4. *S. pulchellus*.

Leaves not at all or minutely ciliate. Glumes narrow, acute . . . . .

5. *S. Lindleyi*.

Spikelets nearly sessile, crowded along the branches . . . . .

6. *S. actinocladius*.

1. *S. virginicus*, Kunth, *Enum.* i. 210.—Stems much branched and leafy at the base, erect or decumbent, 6 to 10 in. or rarely 1 ft. high. Leaves short and narrow, often very spreading, convolute when dry, rather rigid, glabrous or ciliate at the base. Panicle rather dense, narrow and spikelike or rather more branched at the base, 1 to 1½ in. long, often rather dark coloured. Glumes keeled, rather acute, about 1 line long, the 2 outer and the flowering one similar or the lowest rather smaller. Palea rather longer, the 2 nerves close together so as to represent a broad keel, but very readily splitting showing an inflexed margin between the nerves. Grain broadly obovoid, the very thin pericarp separable when soaked but undistinguishable in the dried state.—*Agrostis virginica*, Linn.; Labill. Pl. Nov. Holl. i. 20, t. 23; R. Br. Prod. 170; *Filja virginica*, Beauv.; Trin. Spec. Gram. t. 48.

Queensland. Port Curtis, *M'Gillivray*.

N. S. Wales. Near salt marshes, *Woolfs*; beach near Bulli, *Johnson*.

Victoria. Port Phillip. *R. Brown*; along the coast from the Glendg to Snowy River, *Robertson*, *F. Mueller* and others.

S. Australia. Port Lincoln. *R. Brown*; round Spencer's and St. Vincent's Gulfs, *F. Mueller* and others; Fowler's Bay, *Richards*.

W. Australia. From King George's Sound, *R. Brown* and others, and Esperance Bay, *Dampster*, to Swan and Murchison Rivers, *Drummond*, n. 143, 372, *Preiss*, n. 1841, *Oldfield* and others; Sharks' Bay, *Milne*.

Var? *pallida*. Taller, often above 1 ft. high; leaves narrower and often more erect; spike looser, 2 to 4 in. long, the spikelets often small and pale coloured. Munro is inclined to think that this may be a distinct species.

N. Australia. Gulf of Carpentaria, *R. Brown*; Sturt's Creek, *F. Mueller*; Port Darwin, *Schultz*, n. 645, 749, 764, (also n. 212, with the foliage of the typical form but the spike 2 to 4 in. long, broad and dense.)

Queensland. Prince of Wales Island, *R. Brown*; Brisbane River, *Bailey*; Gracemere, *O'Shanesey*.

N. S. Wales. Richmond River, *Mrs. Hoagkinson*; Darling River, *Dallachy*, *Mrs. Ford*.

**S. Australia.** Murray River and Cadurka, *F. Mueller*; Charlotte Waters, Central Australia, *Giles*.

The species is widely spread over the warmer regions of the New and the Old World, extending into South Africa and North America.

**2. S. indicus, R. Br. Prod. 170.**—An erect tufted grass of 1 to 2 ft., glabrous except a few cilia at the base of the leaves. Leaves chiefly at the base of the stem, narrow, ending in fine points, the upper ones few with long sheaths. Spikelike panicle very narrow, 3 to 5 in. or even longer, continuous throughout or when long often much interrupted. Spikelets very numerous, crowded along the very short erect almost imbricate or distant branches. Outer glumes almost hyaline, obtuse, 1-nerved, the lowest about  $\frac{1}{2}$  line, the 2nd  $\frac{3}{4}$  line long; flowering glume about 1 line, of a firmer consistence, broad but almost tapering to a point, 1-nerved (the whole spikelet rather smaller in some specimens). Palea nearly as long, faintly 2-nerved. Grain broadly obovoid, the very thin pericarp sometimes appearing loose, though often evanescent or undistinguishable in the dried state.—*Kunth, Enum. i. 211*; *S. elongatus, R. Br. Prod. 170*; *Vilfa elongata, Beauv.*; *Trin. Agrost. Vilf. 63*; *Sporobolus tenacissimus, Beauv.*; *Kunth, Enum. i. 211*; *Vilfa tenacissima, Trin. Spec. Gram. t. 60*; *V. capensis, Beauv.*; *Trin. Spec. Gram. t. 56*.

**Queensland.** Brisbane River, Moreton Bay, *F. Mueller*, *Bridg.*, *C. Stuart*; Rockhampton and neighbouring districts, *Becker*, *O'Shaughnessy* and others; Bowen Downs, *Birch*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *Sieber* (*Agrostoth. n. 78*) and others; Macleay River, *Becker*; New England, *C. Stuart*; Tweed River, *Evans*; Mudgoo, *Reyer*; Bulli, *J. Jones*; Lord Howe's Island, *Forbiger*.

**Victoria.** Port Phillip, Mitta-Mitta, etc., *F. Mueller*.

**Central Australia.** Alice Springs, *Giles*.

**W. Australia.** King George's Sound, *F. Mueller*.

Generally spread over tropical and subtropical America, Africa and Asia, extending also into Norfolk Island and New Zealand.

**3. S. diander, Beauv.; Kunth, Enum. i. 213.**—An erect glabrous grass of 1 to 2 or even 3 ft. Leaves chiefly at the base, narrow, the upper sheaths not covering the stem. Panicle narrow but loosely pyramidal, 6 in. to above 1 ft. long, the branches scattered, at length spreading. Spikelets very shortly pedicellate or almost sessile,  $\frac{3}{4}$  to 1 line long. Outer empty glumes very obtuse; hyaline, the upper one about  $\frac{1}{2}$  line, the other shorter. Flowering glume longer, slightly keeled, obtuse or almost acute. Palea broad, obtuse, faintly 2-nerved and not so readily splitting as in the other species. Grain broadly obovoid, the pericarp not readily separable.—*Vilfa crosa, Trin. Agrost. Vilf. 64*.

**Queensland.** Moreton Bay, *Leichhardt*, *C. Stuart*.

**N. S. Wales.** Macleay River, *Becker*; Tweed River, *Guilfoyle*.

Widely spread in East India. This appears to be the true *Agrostis diandra* of Retz and König, as determined by Kunth and others, and as represented by König's specimens in the British Museum, although in Indian as well as in Australian specimens there are generally 3 stamens. The *Vilfa diandra*, Trin. or *Sporobolus diander*, Jacq. f. Ecl. Gram. t. 28, is a different plant described and figured from garden specimens, having the 2nd empty glume as long as the flowering one and probably more constantly diandrous.

4. **S. pulchellus**, R. Br. *Prod.* 170.—Stems tufted, 6 in. to 1 ft. high. Leaves chiefly at the base, flat or keeled, broad or narrow, rather rigid, bordered by rigid cilia tuberculate at the base. Panicle loosely pyramidal, 2 to 5 in. long, with numerous capillary spreading branches verticillate at regular intervals. Spikelets pedicellate, not  $\frac{1}{2}$  line long, shining. Glumes almost hyaline, rather obtuse, slightly keeled, the 2nd outer empty one and the flowering one nearly equal and similar, the lowest empty one about half as long, narrow but obtuse. Palea very readily splitting in two. Grain globular, enclosed in a loose hyaline pericarp.—Kunth, *Rev. Gram.* t. 123 (an unusually narrow-leaved form and the remarkable cilia are not represented); *Vilfa pulchella*, Trin. *Agrost.* Vilf. 37.

**N. Australia.** North Coast, R. Brown; Upper Victoria River, F. Mueller; Fort Darwin, Schultz, n. 112; Escape Cliffs, Hulse.

**Queensland.** Endeavour River, Banks and Solander; Kennedy District, Daintre; Elliot River, Bowman; Peak Downs, Slater.

5. **S. Lindleyi**, Benth.—Nearly allied to *S. pulchellus*. Leaves narrow, not at all or only very shortly ciliate. Panicle very loose, broadly pyramidal, 3 to 5 in. long and broad when fully out, the branches capillary, the lower ones elongated in a dense verticil, the upper ones more scattered. Spikelets  $\frac{1}{2}$  to  $\frac{3}{4}$  line long. Glumes very acute, the lowest outer one very small and narrow, the 2nd also empty and the flowering glume nearly equal, usually dark coloured. Palea usually divided to the base into 2 even at the time of flowering. Seed enclosed in a loose pericarp, as in *S. pulchellus*.—*S. pallidus*, Lindl. in Mitch. *Trop. Austral.* 187, not of Nees; *Vilfa Lindleyi*, Steud. *Syn. Glum.* i. 162; *S. subtilis*, F. Muell. *Fragm.* viii. 140, not of Kunth.

**Queensland.** On the Maranoa, Mitchell; Bokhara Flats, Leichhardt; Grace-mere, Bowman; Curriwillighee, Dalton.

**N. S. Wales.** Liverpool Plains and Darling River, Woolls.

**Victoria.** Portland, F. Mueller.

**Australia.** Fraser's Range, Dempster.

In general this species is very distinct from *S. pulchellus*, both in foliage and in spikelets, but some specimens of Bowman's seem almost to connect the two. They are however far advanced and not perfect. Mitchell's are also far advanced and not so characteristic as younger ones.

6. **S. actinocladius**, F. Muell. *Fragm.* viii. 140.—Stems 1 to 2 ft. high. Leaves flat, tapering to fine points, glabrous. Panicle pyramidal, 3 to 5 in. long, the branches numerous, spreading, the lower ones or nearly all verticillate at regular intervals, the upper ones scattered, all capillary and shortly bare at the base, but bearing narrow dense spikelike partial panicles of  $\frac{1}{2}$  to 1 in. Spikelets sessile and



crowded, nearly 1 line long. Outer glume very small, hyaline, almost obtuse; 2nd very acute, keeled,  $\frac{1}{2}$  to  $\frac{3}{4}$  line long; flowering glume similar but longer. Palea divided into 2 from the base, even at the time of flowering. Seed enclosed in a loose pericarp.—*Vilfa* or *Agrostis actinoclada*, F. Muell. *Fragm.* vi. 84.

**N. Australia.** Sturt's Creek, F. Mueller.

**Queensland.** Gracemere, O'Shanesy; Ballandool River, Looker.

**Central Australia.** Charlotte Waters, Giles.

## 78. MICRAIRA, F. Muell.

Spikelets 2-flowered, the flowers both hermaphrodite or the lower male, all small, in small loose panicles with filiform spreading branches, the rachis of the spikelet articulate above the empty glumes and not produced above the flowering ones. Glumes awnless, 2 outer empty ones equal, membranous, broadly lanceolate, faintly nerved. Flowering glumes close above the empty ones, equal, broad, truncate many-nerved, membranous. Palea several-nerved but 2 of the nerves very prominent. Styles distinct, with short stigmas. Fruiting glumes and palea enclosing the grain but not hardened.

The genus is limited to the Australian species, which is endemic. It has the small spikelets of *Isachne*, and only differs from that genus in the flowering glumes and paleas not hardened over the grain. It is also very nearly allied to *Arundinella* and the genera recently separated from it, which are however all annuals, with the habit of *Ara*.

1. *M. subulifolia*, F. Muell. *Fragm.* v. 208.—A glabrous prostrate or creeping perennial, with short ascending branches, covered at the base with the short broad closely imbricate sheaths of old leaves. Leaves in short dense tufts at the ends of the branches, linear-subulate, erect, under  $\frac{1}{2}$  in. long, the ligula split into cilia. Peduncles from the tufts erect, filiform, 1 to 2 in. long, encased at the base in 2 or 3 long narrow leaf-sheaths. Panicle broad and loose,  $\frac{1}{2}$  in. long or rather more, with capillary spreading slightly divided branches. Spikelets pedicellate, scarcely above  $\frac{1}{2}$  line long, usually dark-coloured, glabrous. Outer glumes as long as the flowering ones.

**Queensland.** Glasshouse Mountains, W. Hall; Rockingham Bay, on rocks, sometimes completely covering them in dense masses, DeClerq, also in L. Schimper's collection.

## 79. ISACHNE, R. Br.

Spikelets 2-flowered, both flowers hermaphrodite or the upper female or the lower male, small, in loose panicles, the rachis of the spikelet articulate above the empty glumes, glabrous and not produced above the flowering ones. Glumes unawned, convex, faintly nerved, 2 outer empty ones nearly equal; flowering ones of a firmer consistence, closely sessile or the upper one slightly raised. Palea as long as the glume. Styles distinct. Grain enclosed in the hardened glume and palea, free from them.











A small tropical genus, common both to the New and the Old World. The Australian species have both a wide range in tropical Asia.

Leaves lanceolate. Spikelets glabrous or nearly so, nearly

1 line long . . . 1. *I. australis*.

Leaves ovate, small. Spikelets hairy, about  $\frac{1}{2}$  line long. . . 2. *I. myosotis*.

1. ***I. australis***, *R. Br. Prod.* 196.—Stems rather slender, decumbent, creeping and rooting at the lower nodes, ascending to 1 ft. or more. Leaves lanceolate, rough with a minute pubescence. Panicle loose, spreading, ovoid in circumscription,  $1\frac{1}{2}$  to 3 in. long, with numerous filiform branches. Spikelets all pedicellate, nearly 1 line long. Outer glumes quite glabrous. Lower flower usually male, with a glabrous glume, the upper female, shortly stipitate, with the glume usually minutely and slightly pubescent, the rhachis slightly dilated and articulate immediately under the upper glume.—*Panicum atrovirens*, Trin.; Kunth, Enum. i. 127; F. Muell. Fragm. viii. 193; *P. antipodum*, Spreng. Syst. i. 314.

Queensland. Moreton Bay, *F. Mueller*.

N. S. Wales. Port Jackson to the Blue Mountains. *R. Brown, Wootls, Sieber, Agrostoth.* n. 68; New England, *C. Stuart*.

Victoria, Gillibrand, Broken, King, Goulburn, Hume and Snowy Rivers, *F. Mueller*.

Also in tropical Asia from Ceylon and the Peninsula to the Malayan Archipelago and South China.

2. ***I. myosotis***, *Nees in Hook. Kew Journ.* ii. 98.—Stems slender, decumbent and branched at the base, short in the Australian specimens, extending to  $1\frac{1}{2}$  ft. in some others. Leaves ovate to ovate-lanceolate; small in the Australian specimens, above 1 in. long in some others, scabrous, with hairy sheaths and ciliate margins. Panicle ovoid and loose with slender spreading branches as in *I. australis* but smaller. Spikelets much smaller, rarely above  $\frac{1}{2}$  line long (not 1 line as given by a clerical error in Fl. Hongk.), the 2 outer glumes more or less pubescent or hirsute, and very much so in the Australian specimens; flowering glumes glabrous or nearly so, the upper flower female, the lower hermaphrodite.—Benth. Fl. Hongk. 415; *Panicum myosotis*, Steud. Syn. Glum. i. 96; F. Muell. Fragm. viii. 193.

N. S. Wales. Russell River, *W. Hill*; (two small specimens in herb. F. Mueller); also in the Malayan Archipelago and South China.

## 80. CÆLACHNE, R. Br.

Spikelets 2-flowered, the upper one usually female, the lower one hermaphrodite, all small in loose or narrow panicles, the rhachis of the spikelet glabrous, articulate, produced between the 2 flowering glumes, but not beyond them. Glumes unawned, convex, 2 outer empty ones broad, faintly nerved, the 3rd or lowest flowering glume close above them and similar but larger. Terminal flowering glume raised on the slender rhachis, smaller than the 3rd. Paleas as long as the glume.

Styles short, distinct, with short stigmas. Fruiting glumes and paleas scarcely hardened, not closed over the grain.

A small genus, spread over tropical Asia, the only Australian species extending to the Malay Peninsula and closely allied to a common Indian one.

1. **C. pulchella**, R. Br. *Prod.* 187.—A weak slender decumbent glabrous grass, rarely ascending to 6 in. Leaves flat, lanceolate or almost linear, flaccid but strongly nerved, under 1 in. long. Panicle narrow but loose, 1 to 3 in. long, the rhachis and short spreading branches filiform. Spikelets mostly pedicellate, scarcely  $\frac{3}{4}$  line long. Outer empty glumes almost orbicular, faintly 3-nerved, the 3rd or lowest flowering glume twice as long as the outer ones, and close above them; rhachis between the flowering glumes as long as the outer glumes. Anthers small. Grain small and narrow.—Kunth, *Rev. Gram.* t. 143.

**Queensland.** Endeavour River, Banks and Solander, A. Cunningham.

Also in Tavoy, Griffith, *Wall. Cat. Herb. Ind. n.* 8909 (partly). The common Indian plant referred to this species in the Fl. Hongk. and in Thwaites Enum. Pl. Zeyl. differs in the erect virgate almost spikelike panicle, the spikelets rather longer, almost imbricate on the short erect branches, and is distinguished by Munro as *Ocalachne brachiata*, Munro (*Isachne simpliciuscula*, W. et Arn., *Panicum brachyglume* and *P. simpliciusculum*, Steud. *Syn. Glum.* i. 95, 96.)

### 81. ERIACHNE, R. Br.

Spikelets 2-flowered, usually not very numerous, in a loose or dense panicle, the flowers both hermaphrodite and similar, the rhachis of the spikelet articulate above the outer glumes and hairy round the flowering ones. Empty glumes 2, persistent, acute or tapering into a point or short awn, many (usually 9- to 11-) nerved. Flowering glumes with fewer nerves, with long spreading hairs on the back or margins, awnless or tapering into a fine straight or curved awn not twisted. Palea very flat, often hairy on the back, with 2 prominent almost marginal nerves. Styles distinct, short. Grain more or less flattened, enclosed in the glume and palea, free from them.

Besides the Australian species, which are mostly endemic, there are several in South Africa, and two or three in tropical Asia, of which one or perhaps two appear to be the same as Australian ones.

Awns much longer than the glumes. Panicle dense.

Spikelets sessile or nearly so.

Palea produced into 2 fine awn-like points.

Outer glumes glabrous, nearly 4 lines long. Awn above 1 in. long . . . . .

1. *E. stipacea*.

Outer glumes hairy, 2 to 2½ lines long. Awn scarcely 1 in. . . . .

2. *E. Armitii*.

Palea-point short, entire or minutely notched.

Nodes densely bearded. Outer glumes hairy, nearly 4 lines long. Awn about 1 in. . . . .

3. *E. squarrosa*.

Nodes glabrous. Outer glumes hairy, about 2 lines long. Awn under ½ in. . . . .

4. *E. glauca*.

Awns much longer than the glumes. Panicle loose, with few pedicellate spikelets. Leaves narrow, hispid with spreading hairs.





- Outer glumes glabrous,  $2\frac{1}{2}$  to 3 lines long . . . . . 5. *E. rara*.  
 Outer glumes hispid,  $1\frac{1}{2}$  lines long . . . . . 6. *E. agrostidea*.  
 Awns not longer than the glumes. Panicle loose. Spikelets pedicellate, usually few.  
 Leaves narrow, hispid with spreading hairs. Small slender plants.  
 Outer glumes  $1\frac{1}{2}$  lines, glabrous . . . . . 7. *E. ciliata*.  
 Outer glumes 2 to  $2\frac{1}{4}$  lines, shortly hairy . . . . . 8. *E. setacea*.  
 Leaves glabrous.  
 Leaves subulate. Outer glumes glabrous, about 4 lines long. Flowering glumes ciliate only . . . 9. *E. avenacea*.  
 Leaves flat. Outer glumes hairy, about 4 lines long. Flowering glume hairy all over . . . . . 10. *E. aristidea*.  
 Leaves narrow. Outer glumes glabrous, scarcely  $1\frac{1}{2}$  lines long. Panicle very loose, with long branches and pedicels . . . . . 11. *E. pallescens*.  
 Panicle narrow, rather more dense. Outer glumes glabrous, about 3 lines long . . . . . 12. *E. festucacea*.  
 Awn none or reduced to a very small point.  
 Panicle dense ovate or oblong. Spikelets very shortly pedicellate. Outer glumes 3 to 4 lines long. Western species . . . . . 13. *E. ovata*.  
 Panicle narrow. Spikelets pedicellate. Outer glumes about 3 lines long.  
 Low plant, with filiform hispid leaves. . . . . 14. *E. melicacea*.  
 Tall plant, with glabrous flat leaves . . . . . 15. *E. pallida*.  
 Panicle loose or reduced to 2 or 3 spikelets. Outer glumes not above 2 lines long.  
 Leaves short, spreading, pungent-pointed, the sheaths covering the short branching stems . . 16. *E. scleranthoides*.  
 Leaves not pungent, the upper ones distant. Spikelets about 2 lines long.  
 Flowering glumes mucronate . . . . . 17. *E. mucronata*.  
 Flowering glumes obtuse or scarcely acute . . . 18. *E. obtusa*.  
 Leaves very fine, hirsute. Small plant.  
 Spikelets Agrostis-like, about 1 line long . . . 19. *E. capillaris*.

1. *E. stipacea*, *F. Muell. Fragm.* v. 206.—Stems 2 or 3 ft. high, the nodes bearded, otherwise glabrous. Leaves narrow, flat. Panicle secund, rather dense, 4 to 5 in. long. Spikelets narrow, not numerous, nearly sessile along the branches. Outer glumes about 4 lines long, glabrous, tapering to a fine point and produced into a straight awn, sometimes nearly half as long as the glume. Flowering glumes shortly hairy all over, with a slender curved awn about  $1\frac{1}{2}$  in. long. Palea flat, tapering to a point divided into 2 awns nearly as long as the palea itself.

**Queensland.** Cape York, *Daemel*.

Var. *Schultziana*. Awns and points of the glumes rather but not much shorter. I can see no other difference.—*E. Schultziana*, *F. Muell. Fragn.* viii. 137.

**N. Australia.** Port Darwin, *Schultz*, n. 150, 183.

2. *E. Armitii*, *F. Muell. Herb.*—Stems 6 in. to 1 ft. high or rather more, the nodes slightly bearded. Leaves narrow, convolute.



Panicle dense,  $1\frac{1}{2}$  to 2 in. long, the rachis slightly hirsute. Spikelets sessile on the short branches. Outer glumes 2 to  $2\frac{1}{2}$  lines long, more or less sprinkled with spreading hairs arising from tubercles, tapering into awn-like points shorter than the glume. Flowering glumes shorter, densely hairy all over, with a fine awn usually about 1 in. long. Palea tapering into 2 fine awn-like points a little shorter than the glume itself.

**N. Australia.** Gilbert River, *Armit*; Norman River, *Gulliver*.

3. ***E. squarrosa***, *R. Br. Prod.* 183.—Stems erect, 2 ft. high or more, the nodes densely bearded with long silky hairs. Panicle dense, 2 to 4 in. long. Spikelets sessile and crowded along the short erect or slightly spreading branches. Outer glumes nearly 4 lines long, tapering to a fine point, hispid with long rigid spreading hairs. Flowering glumes nearly as long, narrow, hairy outside, tapering into an awn of about 1 in. Palea tapering into a short entire point.—*Aira squarrosa*, Spreng. Syst. i. 278.

**N. Australia.** Victoria River, *Elsey*.

**Queensland.** Endeavour River and Bustard Bay, *Barks and Solander*.

The Molucca plant, described and figured by Brongniart in Duperr. Voy. Bot. 24, t. 3, as *E. squarrosa*, Br., but with a 2-awned palea, would appear to me rather to represent the *E. Armitii*.

4. ***E. glauca***, *R. Br. Prod.* 184.—Erect, 1 to 2 ft. high, glabrous and glaucous, the nodes not bearded. Leaves narrow, rather long. Panicle dense, 2 to 4 in. long. Spikelets sessile and crowded along the short erect or slightly spreading branches. Outer glumes about 2 lines long, more or less hairy outside, acute but not awned, faintly nerved. Flowering glumes about as long, sprinkled with hairs outside, the fine awn under  $\frac{1}{2}$  in. long. Palea tapering into an entire or slightly notched point.—Kunth, Rev. Gram. t. 64; *Aira laevis*, Spreng. Syst. i. 278.

**N. Australia.** Islands of the Gulf of Carpentaria, *R. Brown*; Victoria River, and Sturt's Creek, *F. Mueller*.

5. ***E. rara***, *R. Br. Prod.* 183.—Stems slender, scarcely 1 ft. high, the nodes bearded. Leaves very narrow, crowded at the base of the stem, hispid with short spreading hairs. Panicle short, loose, rather secund. Spikelets few, on slender pedicels. Outer glumes acutely acuminate,  $2\frac{1}{2}$  to 3 lines long, glabrous and dark-coloured in the specimens seen. Flowering glumes shorter, hairy all over, tapering into a slender awn nearly 1 in. long. Palea tapering into a fine bifid point.—*Aira rara*, Spreng. Syst. i. 278.

**Queensland.** Shoalwater Bay, *R. Brown*.

6. ***E. agrostidea***, *F. Muell. Fragm.* vii. 82.—A small tufted slender



annual, rarely 6 in. high. Leaves very narrow almost subulate, hispid with spreading rigid hairs. Panicle very loose, with erect capillary branches and pedicels. Spikelets few. Outer glumes  $1\frac{1}{2}$  lines long, hispid with spreading hairs, tapering into short fine points. Flowering glumes nearly as long, ciliate with a few dorsal or marginal hairs, tapering into a capillary awn of a little more than  $\frac{1}{2}$  in. Palea shortly pointed. Stamens 2.

**N. Australia.** Port Darwin, *Schultz*, n. 143; north coast of Arnhem Land, *M'Kinlay*.

7. *E. ciliata*, *R. Br. Prod.* 184.—Slender decumbent and much branched, the stems ascending to 1 ft. in some specimens, under 6 in. in others. Leaves chiefly at the base, short, narrow, fine-pointed, spreading, more or less hirsute with rigid spreading hairs. Panicle loose, with capillary branches and pedicels. Spikelets few. Outer glumes nearly  $1\frac{1}{2}$  lines long, glabrous, thin, acute. Flowering glumes not longer, more acute, with a fine awn nearly as long as themselves, hirsute outside. Palea ciliate outside. Stamens 3. Grain much flattened.—*Aira ciliata*, *Spreng. Syst.* i. 278.

**N. Australia.** Arnhem Land, *R. Brown*, *M'Kinlay*; Port Darwin, *Schultz*; Escape Cliffs, *Hulse*; between Norman and Gilbert Rivers, *Gulliver*.

**Queensland.** Broad Sound, *R. Brown* (rather smaller, the panicle rather more dense).

8. *E. setacea*, *Benth.*—Stems under 1 ft. high, filiform, rigid, the nodes slightly bearded. Leaves also filiform and rigid, sprinkled with short rigid spreading hairs. Panicle loose, of very few pedicellate spikelets. Outer glumes very acute, 2 to  $2\frac{1}{2}$  lines long, shortly hirsute or nearly glabrous. Flowering glumes about as long, with a few hairs on the back near the base, the margins ciliate, tapering into an awn usually shorter than the glume itself. Palea tapering into a long entire or minutely notched point.

**N. Australia.** North Coast of Arnhem Land, *M'Kinlay*.

9. *E. avenacea*, *R. Br. Prod.* 184.—Stems usually about 1 ft. high, slender, the nodes slightly bearded or rarely glabrous. Leaves very fine, subulate, erect, chiefly at the base of the stem. Panicle loose, nearly simple or with few capillary branches bearing 2 or 4 pedicellate spikelets. Outer glumes usually about 3 lines long, very acute or shortly pointed, prominently nerved, glabrous. Flowering glumes glabrous on the back except at the base, the margins ciliate with long hairs, tapering into an awn much shorter than the glume itself. Palea slightly hairy, acutely acuminate.—*Aira avenacea*, *Spreng. Syst.* i. 278.

**N. Australia.** Cavern Island, *R. Brown*; Victoria River and M'Adam Range, *F. Mueller*; Port Darwin, *Schultz*, n. 350; Port Essington, *Armstrong*.

10. *E. aristidea*, *F. Muell. Fragm.* v. 205.—Stems branching and

often decumbent at the base, ascending to from  $\frac{1}{2}$  to  $1\frac{1}{2}$  ft., the nodes usually bearded. Leaves flat, glabrous, the sheaths often broad. Panicle loose, with few spreading branches. Spikelets shortly pedicellate. Outer glumes usually purplish, about 4 lines long, acute, sprinkled with spreading hairs arising from tubercles. Flowering glumes densely silky-hairy except at the top, tapering into an awn scarcely so long as the glume itself. Palea hairy, tapering into a deeply bifid awnlike point.

**Queensland.** Bowen Downs, *Birch*.

**Central Australia.** Lake Eyre, *Andrews*; Charlotte Waters, *Giles*.

**W. Australia.** Murchison River, *Oldfield*.

11. ***E. pallescens***, *R. Br. Prod.* 184.—Stems slender, branching, 1 to  $2\frac{1}{2}$  ft. high, the nodes glabrous. Leaves very narrow, glabrous or slightly ciliate at the base. Panicle very loose, with long capillary branches and pedicels. Spikelets scarcely  $1\frac{1}{2}$  lines long. Outer glumes glabrous, acute. Flowering glumes hairy outside and ciliate, tapering into an awn nearly as long as the glume itself. Palea entire.—*Aira effusa*, Spreng. Syst. i. 278; *Eriachne chinensis*, Hance in Ann. Sc. Nat. ser. 4, xv. 228, and in Journ. Linn. Soc. xiii. 136.

**Queensland.** Endeavour River, *Banks and Solander*; Sandstone Ridges near Rockhampton, *O'Shanesky*.

Also in the eastern provinces of India and in South China.

12. ***E. festucacea***, *F. Muell. Fragm.* v. 205.—Erect, rather rigid, glabrous and glaucous, above 2 ft. high. Leaves convolute, with subulate points. Panicle narrow, not much branched, rather loose, 3 to 5 in. long. Spikelets pale-coloured. Outer glumes acute, glabrous, about 3 lines long. Flowering glumes longer, ciliate in the lower half and sprinkled on the back with a few hairs, tapering into a fine point or awn shorter than the glume itself. Palea entire, slightly hairy.

**N. Australia.** Careening Bay, N. W. Coast, *A. Cunningham*; Upper Victoria and Fitzmaurice Rivers, *F. Mueller*.

13. ***E. ovata***, *Nees in Hook. Lond. Journ.* ii. 418.—Stems from a horizontal glabrous or woolly rhizome erect, rather rigid, 1 to  $1\frac{1}{2}$  ft. high; glabrous or nearly so in the typical form. Leaves chiefly at the base of the stem, very narrow, erect, with subulate points. Panicle dense, ovate or lanceolate, 1 to 2 in. long. Outer glumes acute, nearly 4 lines long, glabrous in the typical form. Flowering glumes as long or longer, pale-coloured, acutely acuminate but not awned, densely hirsute to above the middle with spreading hairs. Palea as long, shortly bifid, less hairy on the back.—*E. Preissiana*, Nees in Pl. Preiss. ii. 102.

**W. Australia.** Swan River, *Drummond*, 1st coll. n. 971, 972; Mount Brown, *Preiss*, n. 1838.

Var. *villosa*. Leaf-sheaths and stems below the nodes densely villous with soft not spreading hairs. Panicle more dense, with more numerous and rather smaller spikelets.—W. Australia, *Drummond*, n. 168, 976 ; Champion Bay, *Oldfield*.

Var. *pallida*. Panicle rather longer and looser. Spikelets pale-coloured, smaller, the flowering glumes more pointed and longer in proportion.

**Central Australia.** Lake Eyre, *Andrews* ; Charlotte Waters, *Giles*.

Nees's descriptive articles on *E. ovata* and *E. Preissiana* are word for word the same, except that in the latter he has substituted spiculis "oblongis" for "ovatis."

14. ***E. melicacea***, *F. Muell. Fragm.* v. 205.—A low tufted species, perhaps annual, 6 to 8 in. high. Leaves very narrow, with subulate points, often as long as the stem, sprinkled with short spreading hairs arising from tubercles. Panicle or raceme of very few (usually 3 to 6) pale-coloured pedicellate spikelets. Outer glumes glabrous, acute, rather rigid, about 3 lines long. Flowering glumes not exceeding them, the margins densely ciliate with long spreading hairs, the back as well as the palea glabrous except at the base or sprinkled with very few hairs.

**N. Australia.** Upper Victoria River, *F. Mueller*.

15. ***E. pallida***, *F. Muell. Herb.*—Stems apparently about 2 ft. high, slender and branching. Leaves flat but narrow, with subulate points, glabrous. Panicle loose but narrow, 2 to 4 in. long, the spikelets all pedicellate. Outer glumes glabrous, about 3 lines long, tapering into fine points. Flowering glumes longer, with fine points, but scarcely awned, glabrous on the back except near the base, the margins ciliate with long hairs. Palea hairy, tapering to a fine bifid point.

**N. Australia.** Dampier's Archipelago, *Walcot*.

16. ***E. scleranthoides***, *F. Muell. Fragm.* viii. 233.—The typical plant a small much-branched procumbent rigid perennial, the flowering branches ascending to 1 or 2 in., the barren ones twice as high, all covered with the closely appressed leaf-sheaths. Leaves spreading, subulate, rigid and pungent-pointed,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long. Panicle reduced to a short raceme of 3 to 6 spikelets or sometimes only 1 or 2 close above the leaves. Outer glumes under 2 lines long, usually dark-coloured, rather broad, glabrous. Flowering glumes similar but thinner and paler coloured, acute or with short fine points not produced into awns, hirsute on the back with long white spreading hairs. Palea as long, hairy or ciliate.

**Central Australia.** Mount Olga, *Giles* ; between Youldah and Ouldabrima, *Young*.

Var. *elongata*. Stems nearly 1 ft. high. Leaves  $\frac{1}{2}$  to 1 in. long, but very spreading and pungent-pointed as in the typical form. Panicle pedunculate, with 6 to 12 spikelets.—McDonnell Ranges, *Giles*.



17. ***E. mucronata***, *R. Br. Prod.* 184.—Stems very slender but rigid, about 1 ft. high. Leaves short, spreading, subulate, with fine points, but not so pungent as in *E. scleranthoides*, the lower sheaths sprinkled with rigid hairs or glabrous, the upper ones distant. Panicle rather loose, 1 to 1½ in. long, of few spikelets closely resembling those of *E. obtusa*, but rather larger, and the flowering glumes tipped with short points exceeding the outer glumes.—*E. brevifolia*, *R. Br. l. c.*; *Aira mucronata*, *Spreng. Syst. i.* 276.

**Queensland.** Endeavour River, *Banks and Sclander*; Dunrobin, Rosewood and other localities near Rockhampton, *O'Shanesy, Thozet*.

18. ***E. obtusa***, *R. Br. Prod.* 184.—A variable grass, usually 1 to 2 ft. high, often branched in the lower part. Leaves narrow, flat or subulate, glabrous or the lower sheaths sprinkled with rigid hairs. Panicle loose, sometimes much-branched and 4 in. long, sometimes almost reduced to a raceme of half-a-dozen spikelets. Spikelets ovoid, about 2 lines long, appearing acute when young, assuming the obtuse aspect when in fruit. Outer glumes membranous, acute, with fewer nerves than most species (usually 5), sprinkled on the back and ciliate with a few long hairs, rarely quite glabrous. Flowering glumes about as long, more obtuse, rarely with a minute point, densely ciliate to the top and sprinkled on the back with spreading hairs. Palea entire, slightly hairy. Grain much flattened.

**N. Australia.** Islands of the Gulf of Carpentaria, *R. Brown, Henne*; Upper Victoria River and Sea Range, *F. Mueller*; Cambridge Gulf and Cygnet Bay. **N. W. Coast.** *A. Cunningham*; Port Darwin, *Schultz, n.* 800; in the interior, *M'Douall Stuart*; Dampier's Archipelago (with smaller spikelets), *Walcot*.

**Queensland.** Endeavour River, *A. Cunningham*; King's Creek, *Bowman*; Springsure, *Wuth*.

**N. S. Wales.** Mount Cunningham in the interior, *A. Cunningham*; between the Darling and Cooper's Creek, *Neilson, Victoria Expedition*.

19. ***E. capillaris***, *R. Br. Prod.* 184.—A slender annual of 6 to 10 in. Leaves short and fine, hirsute. Panicle very loose, 1 to 2 in. long, with long capillary branches and few small dark *Agrostis*-like spikelets on long pedicels. Outer glumes scarcely 1 line long, rather acute, thinly membranous, glabrous. Flowering glumes scarcely exceeding them, acute but unawned, hairy all over but not densely so. Palea as long as the glume, entire, hairy.—*Kunth, Rev. Gram. t.* 63; *Aira hispida*, *Spreng. Syst. i.* 276.

**N. Australia.** Arnhem Land, **N. Coast.** *R. Brown*.

**SUBTRIBE IV. FESTUCACEÆ.**—Spikelets with several often many flowers, rarely reduced to 2, in a loose and spreading or narrow and dense panicle rarely capitate, the rhachis of the spikelet articulate or continuous, usually produced above the flowers or bearing 1 or more terminal empty glumes. Outer glumes usually narrow, keeled, acute or obtuse. Flowering glumes usually broader, entire or







notched at the end, obtuse or the keel or midrib produced into a point or straight awn. Palea usually as long as the glume or nearly so. Grain free within the glume and palea, or adnate to the palea.

## 82. ECTROSIA, R. Br.

Spikelets with 1 or rarely 2 fertile flowers and 2 or more male flowers or empty glumes above them, in a terminal panicle, the rachis of the spikelet articulate above the 2 outer glumes. Outer empty glumes unawned, the 2nd rarely with a short point; glume of the perfect flower with a prominent point or short awn, the upper glumes tapering into fine straight awns. Styles distinct. Grain enclosed in the thin or scarcely hardened glume and palea.

The genus is limited to Australia.

Panicle compact and dense, with short erect branches.

Flowering glume 2 lines long, rather rigid, 3-nerved, entire, tapering into a short awn . . . . . 1. *E. Schultzii*.

Flowering glume 1 line long, thin, notched, with an awn nearly as long as itself . . . . . 2. *E. leporina*.

Panicle slender, loose, the short branches spreading.

Flowering glume about  $\frac{1}{2}$  line long, thin, notched, with a very short point . . . . . 3. *E. agrostoides*.

Flowering glume about 1 line long, 3-nerved, tapering into a short point; glumes of the fruiting spikelet squarrose . . . . . 4. *E. Gulliveri*.

1. ***E. Schultzii*, Benth.**—A glabrous slender but rigid tufted grass, from under 1 ft. to  $1\frac{1}{2}$  ft. high. Leaves chiefly at the base, narrow, ending in subulate points. Panicle narrow and dense but more interrupted than in *E. leporina*, often turned to one side, 2 to 4 in. long. Spikelets not so crowded and longer, with few hairs on the pedicels. Outer glumes scarcely 1 line long, thin and narrow. Lowest flowering glume rigid, lanceolate, distinctly 3-nerved,  $1\frac{1}{2}$  to 2 lines long, quite entire, tapering into a short awn, the next nearly similar but with a longer awn and the flower male only, the upper 2 or 3 glumes narrower and empty.

**W. Australia.** Between Maurice and Victoria Rivers, *F. Mueller*; Port Darwin, *Schultz*, n. 287.

2. ***E. leporina*, R. Br. Prod. 186.**—A glabrous slender grass attaining 2 ft. or more, but sometimes smaller. Leaves very narrow, ending in subulate points. Panicle narrow, dense, 3 to 6 in. long, the fine awns giving it much of the aspect of *Triraphis mollis*. Spikelets crowded along the short erect branches, often purplish, the very short pedicels often bearing a few long hairs. Outer glumes narrow, very acute, about 1 line long. Flowering glume nearly as long, narrow, hyaline, 1-nerved, slightly notched, with a fine awn nearly as long as

the glume. Terminal empty glumes usually 2 or 3, smaller than the flowering one but with longer fine awns.--Kunth, Revis. Gram. t. 69.

**N. Australia.** Coen River, Gulf of Carpentaria, *R. Brown*; Cleveland Bay *A. Cunningham*; Victoria River, *F. Mueller*; Port Essington, *Armstrong*; Port Darwin, *Schultz*, n. 281; between Norman and Gilbert Rivers, *Gulliver*.

**Queensland.** Cape York, *McGillivray*, *Dromed*; Endeavour River, *Banks and Solander*; Brisbane River, *F. Mueller*; Darling Downs, *Law*.

**Var. *microstachya*.** A smaller plant with setaceous leaves. Panicle looser, the spikelets much smaller approaching those of *E. agrostoides*, but rather crowded on the short erect branches as in the smaller specimens of *E. leporina*.--Victoria River, *F. Mueller*, between Norman and Gilbert Rivers, *Gulliver*.

*E. spidiacea*, R. Br. Prod. 186. from Endeavour River, *Banks and Solander*, appears to me not to differ from the typical *E. leporina*, except in the rather smaller dense panicle.

**3. *E. agrostoides*, Benth.**--A slender tufted annual of 6 in. to 1 ft., with setaceous leaves. Panicle narrow but loose, 2 to 3 in. long, the rhachis and spreading branches filiform. Spikelets clustered on the shorter branches, distant on the longer ones. Glumes very narrow, about  $\frac{1}{2}$  line long, the flowering one shortly notched, with a very short point in the notch. Terminal empty ones 2 or 3, tapering into capillary awns of 1 to  $1\frac{1}{2}$  lines.

**N. Australia.** Port Essington, *Armstrong*.

**W. Australia.** A specimen in herb. Hook. marked as from *Dromed*, but there may be possibly some mistake.

**4. *E. Gulliveri*, F. Muell. Fragm. viii. 201.**--A slender erect annual of 6 in. to 1 ft., with setaceous leaves. Panicle narrow but loose, with spreading branches ciliate as well as the very short pedicels with a few long hairs. Spikelets spreading or reflexed. Outer glumes membranous, very pointed, about 1 line long. Flowering glumes 1 or 2, at first very similar to the outer ones, but in the fruiting spikelet rigid, ovate, 3-nerved at the base, tapering into a fine very spreading point, giving the spikelet a squarrose aspect. Terminal empty glumes 2 to 4, with longer points or awns but rarely exceeding 1 line.

**N. Australia.** Between Norman and Gilbert Rivers, *Gulliver*. The spikelets have frequently as in the preceding species only 1 fertile flower but occasionally there are 2 fertile ones and a third male.

### 83. HETERACHNE, Benth.

Spikelets very flat, with 1 fertile flower and several empty glumes above it, nearly sessile and crowded in one or more globular heads, the rhachis of the spikelet articulate only under the perfect flower, very flexuose and continuous above it. Glumes complicate, keeled, rather obtuse, unawned, 2 outer empty ones persistent, the rest of the spikelet falling away with the fruit. Palea nearly as long as the flowering





glume, folded, with 2 broad dorsal wings. Styles short, distinct. Grain oblique or curved, enclosed in the glume and palea but free from them.

The genus is limited to the two Australian species, which appear more nearly allied to *Ectrosia* and *Elytrophis* than to *Eragrostis*, but singular in the whole spikelet with the exception of the outer glumes forming as it were an appendage to the grain.

Spikelets ovate,  $2\frac{1}{2}$  to  $3\frac{1}{2}$  lines long, with more than 6 upper empty glumes, in 1 or 2 heads, sessile in the leaf-sheaths or the upper one shortly pedunculate . . . . . 1. *H. Brownii*.

Spikelets orbicular, scarcely  $1\frac{1}{2}$  lines diameter, with less than 6 upper empty glumes, in several globular small heads, forming a pedunculate interrupted spike . . . . . 2. *H. Gulliveri*.

1. *H. Brownii*, Benth.—Stems 6 in. to 1 ft. high, rigid, simple or slightly branched, slender and almost filiform in a few specimens. Leaves convolute, narrow, with broad loose sheaths. Heads of spikelets few, sessile in the upper sheaths or the terminal one shortly pedunculate, very dense, about  $\frac{1}{2}$  in. diameter and  $\frac{1}{2}$  to 1 in. long. Spikelets nearly sessile, surrounded by a few loose hairs. Outer empty glumes persistent, rather smaller than the flowering ones. Deciduous part of the spikelet ovate,  $2\frac{1}{2}$  to  $3\frac{1}{2}$  lines long, the rachis slightly hairy on the persistent part, glabrous above the articulation, very much recurved and incurved above the flowering glume and flexuose between the upper ones which vary in number from 6 to 14, all empty or with a small palea in the lower ones, narrow, about 1 line long, mostly without lateral nerves, the keel narrowly winged. Palea rather shorter than the glume, the wings broad, hyaline and shortly ciliate.—*Poa abortiva*, R. Br. Prod. 181.

**N. Australia.** Islands of the Gulf of Carpentaria. *R. Brown*: Carron Creek, *Herb. F. Mueller*, collector not named: Port Darwin, *Schultz*, n. 302 (a single apparently depauperate specimen in *Herb. F. Mueller*).

2. *H. Gulliveri*, Benth. in *Hook. Ic. Pl.* t. 1250.—Stems branching at the base and under 6 in. in the specimens seen. Leaves narrow. Heads of spikelets globular, 2 to 3 lines diameter, several sessile in a more or less interrupted pedunculate spike of 1 to 2 in., the rachis of the head hairy between the spikelets, the general axis glabrous. Spikelets almost sessile, orbicular, scarcely above 1 line diameter, almost entirely occupied by the flowering glume and palea, which are broader than in *H. Brownii*, the glume 3-nerved, the keel winged and shortly ciliate at the end, the wings of the palea thin but not hyaline, shortly ciliate. Outer empty glumes smaller, unequal, the lowest 1-nerved, the 2nd 3-nerved but the keel not winged. Upper empty glumes 3 to 5, like the flowering one but narrower.

**N. Australia.** Between Norman and Gilbert Rivers, *Gulliver*. The deciduous part of the spikelets with the enclosed fruit have much of the aspect of those of *Courtoisia* in *Cyperaceæ*.



\* 84. **LAMARCKIA**, Moench.

Fertile spikelets 1-flowered, intermixed with sterile ones in little clusters on the very short branches of an unilateral spike-like panicle, the rhachis of the spikelet glabrous inarticulate and produced above the flower, bearing a narrow empty awnlike glume and sometimes a 2nd rudimentary one above it. Outer empty glumes awnless, flowering one with a small dorsal awn. Sterile spikelets longer, with several truncate awnless empty glumes above the 2 outer acute ones.

The genus is limited to a single species, a native of the Mediterranean region, and perhaps not really naturalised in Australia. It only differs from *Cynosurus* in the fertile spikelets, containing only a single flower instead of 2 or more.

\* 1. **L. aurea**, Moench; Kunth, *Enum.* i. 389.—A very elegant small tufted annual, usually under 6 in. high, the one-sided dense panicle occupying nearly half the length. Outer glumes of the fertile spikelets  $1\frac{1}{4}$  to  $1\frac{1}{2}$  lines long, rather unequal, keeled, with short fine points; flowering glume inserted higher up, broad and convolute round the flower, with a fine dorsal almost terminal awn 2 to 3 lines long. Sterile spikelets rather longer, the 2 outer glumes like those of the fertile one, with several empty ones above them, all broad, obtuse or truncate, elegantly distichous but not closely imbricate.—*Cynosurus aureus*, Linn.; Sibth. Fl. Gr. t. 79; *Chrysurus aureus*, Beauv.; Reichb. Ic. Fl. Germ. t. 58.

Admitted by F. Mueller, *Fragm.* viii. 116, as Australian on the authority of a small specimen from Swan Hill on the Murray River, and a fragment received from Tasmania, in both cases most probably accidentally introduced or cultivated.

85. **PHRAGMITES**, Trin.

Spikelets 3- or more-flowered, flat when open, all pedicellate in a large much-branched panicle, the rhachis of the spikelet elongated between the flowering glumes and covered with very long silky hairs enveloping the flowers. Glumes thin, keeled, the 2 outer ones empty, acute or shortly pointed, the 3rd like them but with a longer point and enclosing a male or rudimentary flower, the others more distant, with long almost awnlike points, the rhachis terminating in a rudimentary glume or bristle-like point. Palea 2-ribbed. Stigmas nearly sessile.

A small genus (or subgenus of *Arundo*) extending over the tropical and temperate and some colder regions of the New as well as the Old World, the Australian species being the common one over nearly the whole area, in wet ditches, marshes and shallow waters.

1. **P. communis**, Trin.; Kunth, *Enum.* i. 251.—A stout perennial usually 5 or 6 ft. high, but sometimes twice as much, with a long creeping rootstock and numerous long leaves often an inch broad, the sheaths covering the stems to the inflorescence. Panicle 6 in. to  $1\frac{1}{2}$  ft.















long, with numerous branches, more or less one-sided and drooping, often of a purplish brown tinge. Spikelets numerous, at first very narrow, 4 to 6 lines long, flat and spreading when in seed, the long silky hairs proceeding from the rhachis and as long as or longer than the glumes, giving the panicle a beautiful silvery aspect; the glumes themselves and the short part of the rhachis below the 3rd glume quite glabrous.—Hook. f. Fl. Tasm. ii. 118; Reichb. Ic. Fl. Germ. t. 108; *Arundo phragmites*, Linn.; R. Br. Prod. 183.

**Queensland.** Gould Island, *M. Gillmeray*; Cape Grafton, *A. Cunningham*; Rockingham Bay, *Dallachy*, southern districts from numerous collectors.

**N. S. Wales.** Port Jackson, *R. Brown*; New England, *C. Stuart*; Clarence River, *Wilcox*; Murrumbidge, *Mrs. Calvert*; Lord Howe's Island, *Fulagar*.

**Victoria.** Melbourne to the western frontier, *R. Barton*, *F. Mueller* and others.

**Tasmania.** Abundant in watery places throughout the island, *J. D. Hooker*.

**S. Australia.** Spencer's Gulf, *R. Brown*; St. Vincent's Gulf, *F. Mueller*.

I have seen no specimens from West Australia.

## 86. DISTICHLIS, Rafin.

Spikelets several-flowered, diœcious, shortly pedicellate in a narrow panicle often reduced to 2 or 3 spikelets, the rhachis glabrous, articulate between the flowering glumes, at least in the females. Outer empty glumes, narrow, keeled. Flowering glumes broader, keeled, many-nerved, all acute, unawned. Palea folded, the keels very prominent or narrowly winged. Stamens in the males 3, without any or with a small rudimentary ovary. Staminodia in the females very rare. Lodicules broad. Ovary glabrous, tapering into 2 rather long styles with exerted stigmas. Grain obovoid or elliptical, free, with a thick spongy pericarp.

The genus consists of a single maritime species of very wide range, chiefly American, with perhaps a second inland one also American. The Australian plant appears to be identical with the common American one.

1. **D. maritima**, Rafin. in *Journ. Phys.* lxxxix. 104.—A rigid glabrous much-branched grass, forming broad low leafy tufts, the branches sometimes growing out to 1 ft. covered to the inflorescence with the leaf-sheaths. Leaves narrow, rigid, very acute or pungent-pointed, usually distichously spreading. Spikelets few, 2 or 3 in the females, rather more in the males, 6 to 9 lines long in the Australian specimens, rather smaller and more numerous in some American ones, flat but rather thick, 8- to 12-flowered. Glumes closely imbricate, about 3 lines long, rather rigid and straw-coloured. Anthers in the males long. Stigmas in the females protruding from the end of the glumes.—*Uniola spicata*, Linn. Spec. Pl. 104; *Brizopyrum spicatum*, Hook. and Arn. Bot. Beech. 403; *Uniola distichophylla*, Labill. Pl. Nov. Holl. i. 21, t. 24; *Poa distichophylla*, R. Br. Prod. 182; *Festuca distichophylla*, Hook. f. Fl. Tasm. ii. 127; *F. Muell.* Fragm. viii. 129; *Poa paradoxa*, Ravn. and Schult. Syst. ii. 569; *Poa Michauxi*, Kunth, Enum. i. 325, Rev.

Gram. t. 181; *Poa thalassica*, Kunth, Enum. i. 326; Rev. Gram. t. 81, 82; *Distichlis thalassica* and *D. maritima*, E. Desv. in C. Gay, Fl. Chil. vi. 397, 398.

**Victoria.** Various points of the sea-coast, *F. Mueller* and others; near Skipton, *Whan*; Murray River, *Dallachy*; Hopkins River, *Sullivan*.

**Tasmania.** Port Dalrymple, *R. Brown*; common on the sea-coasts, *J. D. Hooker* and others.

**S. Australia.** St. Vincent's and Spencer's Gulfs, *F. Mueller* and others.

Some specimens from Kangaroo Island, *Heenzersroeder*, in Herb. F. Muell., have short densely tufted barren branches covered with imbricate leaves with shortly spreading pungent laminae of 3 or 4 lines. I have not seen the ripe grain, but some far advanced ovaries already show the thickened pericarp described by Kunth and by Emile Desvaux. The original generic character given by Rafinesque would have been quite insufficient for identification were it not for the specific synonyms he quotes.

## 87. ELYTROPHORUS, Beauv.

Spikelets small and flat, few-flowered, sessile, in dense compound globular clusters crowded in a cylindrical spike or the lower ones distant, the rachis of the spikelet glabrous, articulate under the flowering glumes. Outer empty glumes narrow, membranous, keeled with short points. Flowering glumes 3-nerved, tapering into long points or short awns, 1 or 2 upper glumes empty or with male flowers. Palea folded, with 2 dorsal wings. Stamen 1. Styles free, distinct. Grain smooth, free.

The genus is limited to the single Australian species, widely spread over tropical Asia and Africa.

1. ***E. articulatus*, Beauv.; Kunth, Enum. i. 391, Rev. Gram. t. 154.**—An erect glabrous annual, from under 6 in. to rather above 1 ft. high including the inflorescence. Leaves flat, often longer than the stem, with loose sheaths. Spikelets small and very numerous, the globular clusters sessile in a cylindrical spike 3 to 4 lines diameter and often occupying the greater part of the plant, either continuous throughout or interrupted and shortly branched at the base. Glumes rarely 1 line long without the points, the awns of the flowering ones about as long as or rarely longer than the glume. Dorsal wings of the palea entire or denticulate, either both or one only rather broad.

**N. Australia.** Victoria River, *F. Mueller*; between Norman and Gilbert Rivers, *Gulliver*.

**Queensland.** Rockhampton and neighbouring districts, *O'Shaunessy*, *Bowman*; Bowen Downs, *Birch*.

**S. Australia.** Murray River, *F. Mueller*; Charlotte Waters, Central Australia, *Giles*.











88. **KOELERIA**, Pers.

Spikelets 2- or more-flowered, flat, shortly pedicellate, numerous in a dense spike-like cylindrical or interrupted panicle, the rachis of the spikelet articulate between the flowering glumes, glabrous. Glumes keeled, acute or produced into short straight awns or points, 2 outer empty ones unequal and scarious on the margin only; flowering glumes similar but more scarious or hyaline, the upper ones gradually smaller, the lowest the largest and sessile within the empty ones, the uppermost one or two usually empty. Palea very thin, acutely 2-keeled, 2-toothed or 2-pointed. Styles very short. Grain enclosed in the glume and palea free from them.

A small genus ranging over the temperate regions of the northern hemisphere, more sparingly distributed in the southern and perhaps most frequently introduced. The Australian species are both common northern ones.

Perennial. Larger glumes acute, 2 to 3 lines long . . . . 1. *K. cristata*.

Annual. Larger glumes shortly awned,  $1\frac{1}{2}$  lines long . . . . 2. *K. phleoides*.

1. ***K. cristata***, Pers.; Kunth, *Enum.* i. 381.—A perennial, the common northern form usually about 6 in. high with a dense tuft of short leaves and a cylindrical spike-like panicle of 1 to 2 in., the spikelets mostly 2- or 3-flowered, the Australian specimens belonging chiefly to a luxuriant form 1 to 2 ft. high. Leaves pubescent-ciliate. Spike-like panicle 3 to 6 in. long, interrupted at the base, very shining. Spikelets 4 to 5 lines long, with 5 to 7 flowers. Outer glumes 3 lines long, very thin, scarious on the edges, 3- or 5-nerved; flowering glumes more scarious, almost nerveless except the green keels, all acute but not awned.—Hook. f. *Fl. Tasm.* ii. 126; Reichb. Ic. *Fl. Germ.* t. 93.

**N. S. Wales.** North of Bathurst, *A. Cunninghamham* (large and luxuriant).

**Victoria.** Wimmera, *Curdie* (the small typical form).

**Tasmania.** Macquarrie Plains, *Gunn* (large and luxuriant).

The species ranges over the temperate and subtropical regions of the New and the Old World in the northern hemisphere, and in some parts of the southern.

2. ***K. phleoides***, Pers.; Kunth, *Enum.* i. 383.—An erect tufted annual of 6 in. to 1 ft. usually glabrous except long cilia on the margins and orifice of the leaf-sheaths. Spikelike panicle  $\frac{3}{4}$  to  $2\frac{1}{2}$  in. long, cylindrical or when large slightly branched. Spikelets about 2 lines long, with 5 to 7 flowers. Glumes very spreading, the larger ones  $1\frac{1}{2}$  lines long with a point or awn rarely above 1 line long, the outer empty ones unequal, the lowest small and acute, the 2nd shortly pointed and nearly as long as the flowering ones, the terminal empty glume or glumes usually broader, shorter and awnless.

**N. S. Wales.** Yass, *Mrs. Calvert*; Mudgee, *Taylor*.

**S. Australia.** Adelaide and Torrens River, *F. Mueller*; Swan Hill, *Gumerson* (the latter with very short awns).

The species extends over the whole of the Mediterranean region from the Azores to Afghanistan, and may be introduced only into Australia.

\* 89. **DACTYLIS**, Linn.

Spikelets several-flowered, sessile and densely crowded in thick one-sided clusters, arranged in a short irregular spike or at the ends of the short branches of a dense irregular one-sided panicle. Flowering glumes 3- or 5-nerved, the keel prominent and produced into a point or short awn. Grain free, concave or broadly furrowed.

The genus is limited to a single species common in Europe, temperate Asia and North Africa, and now naturalised in Australia as in some other countries.

\* 1. **D. glomerata**, Linn.; Kunth, *Enum. i.* 386.—A coarse stiff grass of 1 to 2 ft., the perennial stock forming at length dense tufts. Clusters of spikelets dense and ovoid, sometimes collected into a close spike of about 1 in. sometimes in a broken spike of several inches or on the branches of a short, more or less spreading panicle. Each spikelet much flattened, 3- to 5-flowered. Flowering glumes lanceolate, 2 to 2½ lines long, ciliate on the back, outer glumes rather shorter, narrow, with a prominent ciliate keel.—Reichb. *lc.* Fl. Germ. t. 59; F. Muell. *Fragm.* viii. 126.

Now naturalised in various localities in **N. S. Wales** and **Victoria**, *F. Mueller* and others.

90. **CENTOTHECA**, Desv.

Spikelets several- (usually 3-) flowered, flat, all pedicellate in a loose spreading panicle, the rachis of the spikelet slender, inarticulate, glabrous. Glumes acute or minutely pointed, unawned, keeled, the lowest flowering glume close above the 2 outer empty ones and like them glabrous, the upper flowering ones bearing on the marginal nerves a few rigid bristles at first erect, at length reflexed. Palea 2-keeled. Ovary glabrous. Styles distinct, short. Grain oblong, not furrowed free.

The genus is limited to the single Australian species, generally spread over tropical Asia and Africa.

1. **C. lappacea**, Desv.; Kunth, *Enum. i.* 366, *Revis. Gram. t.* 70.—An erect glabrous grass of many feet. Leaves flat, ½ to ¾ in. broad, the numerous parallel nerves very prominent; ligula short, ciliate or jagged. Panicle terminal, 8 to 10 in. long and as broad when open, the capillary branches slightly divided. Spikelets 3 to 4 lines long, green. Lowest empty glume a little more than 1 line, the 2nd 1½ lines long; flowering glumes a little larger, the rachis produced into a short point beyond the uppermost one, or bearing a small terminal empty















glume. Flowers within the glumes often distinctly stipitate with the palea inserted on the stipes.—Beauv. *Agrost.* t. 14, f. 7.

**Queensland.** Daintree River, *Fitzalan*; Johnston River, *Gulliver*.

Var. *lyphon*. Spikelets smaller with only 2 flowering glumes, the lowest glabrous like the outer ones, the upper one alone setiferous.—Rockingham Bay, *Dallachy*.

## 91. ERAGROSTIS, Beauv.

Spikelets several- usually many-flowered, pedicellate or sessile in a loose and spreading or narrow and clustered panicle, the rhachis of the spikelet usually glabrous and articulate under the flowering glumes, but often very tardily so and sometimes inarticulate. Outer empty glumes unequal and rather shorter than the flowering ones, keeled, without any or only faint lateral nerves. Flowering glumes obtuse or acute, unawned, 3-nerved, the keel prominent, the lateral nerves in a few species very faint. Palea shorter than the glume, with 2 prominent nerves or keels, often persisting after the glume and grain have fallen away. Grain free, ovoid or oblong, not furrowed.

The genus is as widely spread as *Poa* in warm and temperate regions, but disappears in cold countries and high mountains. Of the nineteen Australian species five at least are common East Indian ones, one of them abundant also beyond the tropics in the Old World, one is also in New Zealand, the remaining thirteen have not yet been absolutely identified with extra Australian species, although some of them as observed by Munro are very closely connected if not identical with South African or American species. The limits to be assigned however to some of the variable ones are as yet very uncertain, and in F. Mueller's collections there are two or three more which may prove to be distinct species but of which the specimens are scarcely sufficient for identification.

**SECT. I. Chaunostachya.**—*Spikelets somewhat flattened, the glumes rather distant, loosely imbricate, overlapping the rhachis at the base so as not to leave a longitudinal furrow, usually very thin with the lateral nerve on each side faint or marginal.*

The first three species have the few-flowered spikelets with the rhachis very readily disarticulating of *Poa*, but always only one instead of two nerves on each side of the keel of the flowering glumes.

Spikelets usually 3- or 4-flowered, pedicellate, in a spreading panicle.

Spikelets very numerous and minute,  $\frac{1}{2}$  to  $\frac{3}{4}$  line long.

Grain ovoid, smooth . . . . . 1. *E. tenella*.

Spikelets on long capillary pedicels, 1 to 2 lines long.

Grain globular, tuberculate . . . . . 2. *E. nigra*.

Spikelets few, shortly pedicellate, in a loose panicle, 1 to 2 lines long. Grain ovoid, smooth . . . . . 3. *E. imbecilla*.

Spikelets linear, more than 6-flowered.

Glumes very obtuse truncate or emarginate. Spikelets numerous, in a loose panicle . . . . . 4. *E. trichophylla*.

Glumes acute or rarely almost obtuse.

Spikelets numerous, pale-coloured, shining, shortly pedicellate and crowded on the long branches of a narrow panicle.

- Grain oblong-linear . . . . . 5. *E. leptocarpa*.  
 Grain broadly obovoid . . . . . 6. *E. megalosperma*.  
 Spikelets numerous, very narrow linear, shortly  
 pedicellate and distant along the capillary  
 erect branches of the panicle . . . . . 7. *E. pilosa*.  
 Spikelets not very numerous, linear-lanceolate,  
 pedicellate, in a spreading panicle . . . . . 8. *E. leptostachya*.

SECT. II. **Megastachya**.—*Spikelets when mature very flat. Glumes closely imbricate in 2 distinct rows, leaving a longitudinal furrow or depression between them on each side of the spikelet, the lateral nerve usually prominent in the middle of each side of the glume.*

Base of the stems glabrous, not at all or scarcely thickened.

Spikelets narrow, about 3 lines long, crowded secund and spreading or reflexed on the short clustered branches of a simple panicle. Glumes very acute

9. *E. Schultzei*.

Spikelets under 3 lines, sessile in small dense globular or oblong clusters sessile along a simple rhachis. Stamens usually 2 . . . . .

10. *E. diandra*.

Spikelets 3 to 6 lines, rather narrow, usually sessile and erect, scattered or clustered, rarely shortly pedicellate and spreading, in a simple or branched panicle. Stamens usually 3 . . . . .

11. *E. Brownii*.

Spikelets 3 to 6 lines long, broad sessile and crowded on a short almost simple rhachis. Palea-keels ciliate with long rigid hairs. . . . .

12. *E. concinna*.

Spikelets narrow, clustered along the long erect branches of a narrow panicle. Palea narrow, truncate, glabrous, not above  $\frac{1}{2}$  as long as the glume . . . . .

13. *E. speciosa*.

Base of the stem and short sheath of radical leaves thickened into an almost bulbous woolly-hairy base.

Spikelets shortly pedicellate, nearly 2 lines broad, the base of the flowering glumes woolly-hairy . . . . .

14. *E. laniflora*.

Spikelets sessile, scattered, glabrous, above 1 line broad . . . . .

15. *E. eriopoda*.

Spikelets shortly pedicellate, glabrous, about  $\frac{3}{4}$  line broad . . . . .

16. *E. chatophylla*.

SECT. III. **Cylindrostachya**.—*Spikelets very narrow, terete or nearly so. Glumes closely appressed.*

Spikelets 10- to 30-flowered, rather obtuse, shortly pedicellate in a small panicle . . . . .

17. *E. lacunaria*.

Spikelets 12- to 50-flowered, obtuse, sessile, usually clustered, often incurved . . . . .

18. *E. falcata*.

Spikelets 8- to 10-flowered, rather acute, nearly sessile, divaricate, on the spreading branches of the panicle . . . . .

19. *E. stenostachya*.

*Poa peruviana*, Steud. Syn. Glum. i. 262, from Port Jackson, D'Urville, is described as having the flowering glumes with only one nerve on each side, and would therefore be an *Eragrostis*, but his character is insufficient for identification. *Eragrostis vimina*, Steud. l. c., from New Holland and New Zealand, with a 5-nerved flowering glume, is certainly no *Eragrostis*, but cannot be determined without seeing a specimen.



SECT. I. CHATNOSTACHYA.—Spikelets narrow or very small, somewhat flattened, the glumes rather distant, loosely imbricate, overlapping the rhachis at the base so as not to leave the longitudinal furrow of *Megastachya*, usually very thin or hyaline, the lateral nerve on each side usually faint or marginal, the rhachis often as readily disarticulating as in *Poa*, the palea rarely persistent after the fall of the grain.

1. **E. tenella**, Beauv.; Benth. Fl. Hongk. 431.—An erect tufted annual, from 6 in. to near 2 ft. high. Leaves flat, usually narrow, glabrous. Panicle usually occupying the greater part of the plant, with very numerous capillary much divided branches, the lower ones in distant whorls or clusters. Spikelets pedicellate, minute, rarely  $\frac{3}{4}$  line long, with 3 or 4 or rarely 6 flowers. Glumes thin, almost hyaline, obtuse, about  $\frac{1}{2}$  line long, the lateral nerve on each side almost marginal, very loosely imbricate, the rhachis articulate. Palea glabrous, as long as the glume. Stamens varying 1 to 3. Grain very small, ovoid.—*Poa tenella*, Linn.; R. Br. Prod. 181.

**N. Australia.** Upper Victoria and Fitzmaurice River, F. Mueller; Gulf of Carpentaria, Landsborough, Gulliver.

**Queensland.** Broad Sound, R. Brown; Port Denison, Fitzallan; Rockhampton and neighbouring districts. Tenzel, Bowman, O'Shaunsey; Kennedy district, Daintree; Mitchell district, Birch.

**Victoria.** King River, F. Mueller.

**Central Australia.** Macdonnell Range and Charlotte Waters, Giles; Stephenson River, M'Douall Stuart.

Widely spread in eastern tropical Asia.

The confusion between this species and *E. plumosa*, Link (*P. amabilis*, Linn.) was cleared up by Munro in Journ. Linn. Soc. vi. 43, and the result given in Fl. Hongk. as above quoted. Kunth's figure of *P. tenella*, Rev. Gram. t. 147, represents the *E. plumosa*.

2. **E. nigra**, Nees in Steud. Syn. Glum. 267, var. *trachycarpa*.—Leaves only seen in one specimen, narrow, rather short, glabrous. Panicle 1 ft. long or more, very loose, with very long capillary divided branches, bearing few small dark-coloured spikelets on long capillary pedicels, the spikelets ovate, 1 to 2 lines long, loosely 2- to 4-flowered, quite glabrous. Flowering glumes broad, obtuse or scarcely acute, hyaline, the lateral nerves scarcely conspicuous. Palea as long, usually broad. Stamens 3, with small anthers. Grain large in proportion, globular, prominently rugose-tuberculate.

**N. S. Wales.** New England, C. Stuart; Armidale, Perrett. It is on the authority of Munro that I have referred this to the East Indian *E. nigra*, from which our specimens differ slightly in the longer pedicels and more prominently rugose grain.

3. **E. imbecilla**, Benth.—Stems tufted and branched at the base, weak and filiform, ascending to from 6 in. to 1 ft. Leaves very narrow, spreading. Panicle loose and slender, with few distant branches mostly undivided. Spikelets few, pedicellate,  $1\frac{1}{2}$  to 2 lines long, rather loosely

4- to 6-flowered, glabrous. Flowering glumes scarcely above  $\frac{1}{2}$  line long, hyaline, the lateral nerves almost or quite marginal. Palea curved, sometimes persistent, but usually falling off with the glume on the rhachis disarticulating.—*Poa imbecilla*, Forst. (name only); Spreng. Mant. i. Fl. Hal. 33; Hook. f. Handb. N. Zel. Fl. 337, but not of R. Br.; *P. Sprengelii*, Kunth, Enum. i. 363, wrongly referred by Steudel to *P. implexa*, Trin.

**Queensland.** Herbert's Creek, *Bethune*. I cannot distinguish these specimens from those described by Hooker from New Zealand. Forster's plant is only known from Sprengel's imperfect character; which however as far as it goes agrees fairly with our plant, except that he says the leaves are very long.

4. ***E. trichophylla*, Benth.**—Stems densely tufted, about 1 ft. high, slender. Leaves very narrow, the sheaths sprinkled with long fine spreading hairs. Panicle loose, spreading, 3 to 4 in. long, with numerous scattered divided capillary branches. Spikelets on filiform pedicels, very narrow, slightly compressed, 2 to 4 lines long, loosely 8- to 12-flowered, the rhachis articulate. Glumes rather distant, closely appressed,  $\frac{1}{2}$  to  $\frac{3}{4}$  line long, broad, very obtuse truncate or emarginate, thin and shining, the lateral nerves prominent. Palea nearly as long, glabrous. Stamens 2 or 3. Grain small but not seen ripe.

**S. Australia.** North of Fowler's Bay, *Giles*. This species appears to connect the sections *Chaunostachya* and *Cylindrostachya*.

5. ***E. leptocarpa*, Benth.**—An elegant slender grass, from under 1 ft. to 2 ft. high, with much of the habit, the flat leaves, and inflorescence of *E. tenella*. Panicle at first narrow, at length spreading with numerous much divided capillary branches, the lower ones often clustered and in the larger specimens 6 in. long and the whole panicle 9 or 10 in., in other specimens much smaller. Spikelets narrow-linear, 2 to 3 lines long, loosely 6- to 12-flowered, pale-coloured and shining, glabrous. Glumes very narrow, rather acute,  $\frac{3}{4}$  line long, thin and hyaline, the lateral nerves not very conspicuous. Palea nearly as long. Stamens usually 2, anthers very small. Grain oblong-linear, sometimes very narrow and as long as the glume, in other specimens shorter.

**Queensland.** Mitchell District, *Birch*.

**Central Australia.** Charlotte Waters, *Giles*.

6. ***E. megalosperma*, F. Muell. Herb.**—Stems 2 to 3 ft. high, the branches almost filiform but often rigid and clustered. Leaves long and narrow, flat or convolute, glabrous. Panicle narrow and compact, 3 to 8 in. long, with erect branches. Spikelets sessile or shortly pedicellate, erect, crowded, linear, about 3 lines long when fully out, rather silvery-shining, loosely 6- to 8-flowered, the rhachis glabrous, scarcely articulate. Flowering glumes about 1 line long, acute, the lateral nerves often scarcely conspicuous except at the base. Palea nearly as long, scarcely curved. Stamens usually 2, oblong. Grain

broadly ovoid, often  $\frac{3}{4}$  as long as the glume, readily falling away leaving the glume and palea more persistent.

**Queensland.** Rockhampton, *O'Shanesy*; Gwydir River, *Leichhardt*.

7. **E. pilosa**, *Beaur. Agrost.* 71.—A tufted erect or ascending annual, 1 to near 2 ft. high. Leaves narrow, usually flat. Panicle 6 in. to 1 ft. long, narrow at first, spreading when in fruit, with numerous long capillary divided branches. Spikelets 2 to 4 lines long, narrow linear, usually of a dark leaden colour but pale when old, loosely 6- to 20-flowered, the rachis scarcely articulate. Glumes thin, distinctly keeled, the lateral nerves faint and short. Palea nearly as long, slightly ciliate on the keels, often persistent after the glumes have fallen away. Grain ovoid-oblong, smooth.—*Poa pilosa*, Linn.; Kunth, Enum. i. 329; *P. verticillata*, Cav. Ic. i. 63, t. 93; *P. parviflora* and *P. pellicida*, R. Br. Prod. 180, 181; *E. parviflora*, Trin. in Mem. Acad. Petersb. 1831, 411; *E. pellicida*, Steud. Syn. Glum. 279; *P. tenella*, Sieb. Agrostoth. n. 79, not of Linn.

**Queensland.** Broad Sound, *R. Brown*; Kennedy District, *Dainton*; Rockhampton and neighbouring districts, *B. Brown*, *Th. Zet.* *O'Shanesy*; Brisbane River, *Bailey* and others.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *W. L.* and many others; New England, *C. Stuart*; Clarence River, *Wilcox*.

**Victoria.** Ovens and Murray Rivers, *F. Mueller*; Portland, *Allitt*.

A common weed in the warmer and some temperate regions of the northern hemisphere, chiefly in the Old World. The hairs at the base of the branches of the panicle, which originally gave rise to the specific name, are not observable in any of the Australian specimens and not constant in European ones.

8. **E. leptostachya**, *Steud. Syn. Glum.* i. 279.—Stems slender, usually about 1 ft. high. Leaves at the base narrow, convolute or setaceous, glabrous. Panicle loosely pyramidal, 3 to 5 in. long, with slender divided spreading branches. Spikelets on capillary pedicels of 1 to 3 lines, loosely spreading, about 2 lines long, narrow, but much broader than in *E. pilosa*, much smaller than in *E. Brownii*, loosely 6- to 10-flowered, usually dark-coloured. Glumes acute, more spreading than in *E. pilosa*, the lateral nerves faint and almost marginal. Palea nearly as long, glabrous. Grain ovoid, smooth.—*Poa leptostachya*, R. Br. Prod. 180.

**Queensland.** Brisbane River, *Bailey*; King's Creek, *Bowman*.

**N. S. Wales.** Port Jackson, *R. Brown*, *Woolfs*; New England, *C. Stuart*; Illawarra, *Johnson*; Macleay River, *Becker*.

The species appears to be intermediate between *E. pilosa* and *E. Brownii*, var. *patens*, but distinct from both.

SECT. II. MEGASTACHYA.—Spikelets when mature very flat, the glumes usually numerous, closely imbricate in two distinct rows, leaving a longitudinal depression or furrow on each face of the spikelet, the lateral nerve usually prominent about the middle of the side, the rachis less readily disarticulating than in *Chaenostachya* and the palea very frequently persisting after the glume and grain have fallen away.



9. **E. Schultzii**, *Benth.*—Stems rather rigid, 3 ft. high or more. Leaves as long, flat, the larger ones 2 to 3 lines broad, quite glabrous. Panicle narrow, 6 to 8 in. long, with short spreading branches, the lower ones in distant clusters, the upper ones scattered. Spikelets crowded and clustered along the branches from their base, all turned to the lower side, and very spreading or reflexed, sessile or very shortly pedicellate, flat when full grown, 2 to 3 lines long, 8- to 12-flowered. Glumes closely distichous, acutely keeled and acute, the lateral nerve prominent on each side. Palea nearly as long. Stamens 3. Grain very small, ovoid.

**N. Australia.** Port Darwin, *Schultz*, n. 81.

10. **E. diandra**, *Steud. Syn. Glum.* i. 279.—Stems 1 to 2 ft. high. Leaves very narrow, often convolute, glabrous. Panicle usually contracted into an interrupted spike of 3 to 6 in. Spikelets very numerous, rarely above 2 lines long, flat, scarcely 1 line broad, 6- to 12-flowered, sessile in dense sessile clusters, the upper ones forming a cylindrical spike 3 or 4 lines diameter, the lower clusters usually distant, the lowest oblong or forming a cylindrical sessile spike of  $\frac{1}{2}$  in. or more. Flowering glumes closely distichous, thin, rather obtuse, the lateral nerves in the centre of each side or near the margin. Rhachis tardily or not at all articulate. Palea nearly as long as the glume, incurved. Stamens 2 with small anthers in the flowers examined but perhaps sometimes 3. Grain ovoid.—*Poa diandra*, R. Br. Prod. 180; *P. interrupta*, Sieb. Agrostoth. n. 74.

**N. Australia.** Upper Victoria River and Sturt's Creek, *F. Mueller*.

**Queensland.** Koppel and Shoalwater Bays, *R. Brown*; northern districts, *Gulliver, Armit*; Rockhampton and southern districts, *Thwait, Brunetta, Leichhardt, Bailey* and others.

**N. S. Wales.** Port Jackson, *R. Brown*; New England, *C. Stuart*; Clarence River, *Wilcox, Beckler*.

**S. Australia.** Tamunda, *F. Mueller*.

**W. Australia.** Drummond, n. 170; Blackwood River, *Walcot, Forrest*.

In the case of some specimens it is difficult to decide whether they should be referred to this species or to an extreme form of *E. Brownii*, though generally the two appear very distinct. The number of stamens, 2 in *E. diandra*, 3 in *E. Brownii*, is not I believe constant.

11. **E. Brownii**, *Nees in Steud. Syn. Glum.* i. 279.—A very variable plant in stature and aspect, usually above 1 ft. high, with very narrow flat or convolute leaves, glabrous except a few cilia at the orifice of the sheaths not by any means constant. Panicle sometimes simple and dense, a few inches long, almost spikelike with numerous small densely clustered spikelets, always however longer and more acute than in *E. diandra*, sometimes with short spreading branches and few spikelets, sometimes a foot long with few distant branches and long spikelets singly scattered or in distinct clusters, and a great variety of intermediate forms. Spikelets always sessile or very nearly so, flat, varying from  $\frac{1}{4}$  to  $\frac{1}{2}$  in. long, with 10 to 40 flowers, the rhachis very tardily articulate. Flowering glumes closely distichous, the lateral nerve

nearly central on each side and prominent. Palea shorter than the glume, incurved, the keels usually minutely ciliate. Stamens usually 3, but sometimes only 2 even in the larger spikelets. Grain ovoid-oblong, smooth.—*Poa polymorpha*, R. Br. Prod. 180; *Megastachya polymorpha*, Beauv. Agrost. 74; *Poa Brownii*, Kunth, Enum. i. 333.

**N. Australia.** Islands of the Gulf of Carpentaria, *R. Brown*, *Humb.*: Victoria River and Sturt's Creek, *F. Mueller*; Dampier's Archipelago, *Walpole*; Port Essington, *Armitage*; Port Darwin, *Schultz*, n. 210, 312, 453. These northern specimens chiefly with rather large scattered or slightly clustered spikelets, and have sometimes the leaf-sheaths slightly hairy, which constitutes the *Poa pubescens*, R. Br. Prod. 181; *Eragrostis pubescens*, Steud. Syn. Glum. i. 279,

**Queensland.** Prince of Wales Islands and Koppel Bay, *R. Brown*; numerous localities in northern and southern Queensland and in the interior, *A. Cunningham*, *F. Mueller*, *McGillivray*, *B. Brown*, *O'Shaughnessy*, and many others, with very numerous varieties.

**N. S. Wales.** Port Jackson, *R. Brown*, *Wells* and others; New England, *C. Stuart*; Liverpool plains, *C. Moore*; Clarence River, *Wells*; Richmond River, *Fuscott*; Lachlan and Darling Rivers, *A. Cunningham*, *Darling* and others; chiefly with small spikelets.

**Victoria.** Dandenong Ranges, King, Murray and Ovens Rivers, *F. Mueller*; Glenelg River, *Robertson*.

**W. Australia.** Blackwood River, *Walpole*; Murchison River, *Oldfield*.

**Var. interrupta.** A larger plant, often 3 or 4 ft. high, with long flat leaves and large spikelets in dense distinct clusters.—*Poa interrupta*, R. Br. Prod. 180; *Eragrostis interrupta*, Steud. Syn. Glum. i. 279.—Endeavour River, *Banks and Solander*; Hervey Bay, *R. Brown*; Clarence River, *Wells*; Tweed River, *C. Moore*; also in *Leichhardt's* collection.

**Var. patens.** Panicle loose, often spreading. Spikelets rather small, most of them shortly pedicellate.—Port Jackson and Blue Mountains, *R. Brown*, *Wells* and others; Victoria, *F. Mueller*.

The species appears to be widely spread in East India and should probably include *E. zeylanica*, Nees, and some others, and comes very close to some American ones.

*E. Ureoides*, Steud. Syn. Glum. i. 279, from New Holland, *F. Ureide*, is unknown to me, but there is nothing in Steudel's diagnosis to distinguish it from *E. Brownii*.

12. **E. concinna**, Steud. Syn. Glum. i. 279.—A rigid tufted grass under 1 ft. and often under 6 in. high. Leaves convolute, subulate, erect, glabrous except a few cilia at the orifice and margins of the sheaths. Panicle reduced to an interrupted spike shorter than the leaves. Spikelets sessile or nearly so, in dense clusters but not numerous, erect, very flat, pale-coloured, 3 to 5 lines long and  $1\frac{1}{2}$  lines broad, with 10 to 20 or even more flowers, the rachis at length articulate. Flowering glumes closely distichous, rather rigid,  $1\frac{1}{2}$  lines long, the lateral nerve on the middle of each side very prominent. Palea rather broad, the keels ciliate especially in the upper half with long rigid cilia. Stamens 2, with very small anthers.—*Poa concinna*, R. Br. Prod. 180.

**N. Australia.** Islands of the Gulf of Carpentaria, *R. Brown* (according to his herbarium, but marked in the Prodrœmus by mistake as from Port Jackson).

**Central Australia.** Lake Eyre, *Andrews*, *Levis*.

13. *E. speciosa*, Steud. *Syn. Glum.* i. 279.—Stems 2 to 3 ft. high. Leaves long and narrow, convolute, almost filiform, glabrous. Panicle long and narrow or with a few long erect branches, the lower ones distant. Spikelets sessile, more or less clustered, glabrous, of a pale or leaden colour, very flat and neat, 3 to 6 lines long, about  $\frac{3}{4}$  line broad, with 10 to 20 flowers in some specimens, as many as 40 in others, the rhachis scarcely articulate. Glumes very thin, obtuse,  $\frac{3}{4}$  line long, the lateral nerve prominent at the base on each side. Palea not  $\frac{1}{2}$  as long, curved, truncate, persistent. Stamens 2 in the flowers examined.—*Poa elegans*, R. Br. Prod. 181; *P. speciosa*, Rœm. and Schult. Syst. ii. 573.

**N. Australia.** Islands of the Gulf of Carpentaria, *R. Brown*.

**Queensland.** Robinson River, *Armit*; Gracemere, *O'Shaughy*; King's Creek, *Bowman*.

**Central Australia.** Hamilton River, *M'Douall Stuart*.

14. *E. laniflora*, Benth.—Rhizome and somewhat bulbous bases of the stems woolly-hairy. Stems 1 to  $1\frac{1}{2}$  ft. high, slightly cottony at the nodes. Leaves narrow, flat, with scabrous sheaths. Panicle loose, 4 to 6 in. long, with few divaricate or reflexed scabrous branches. Spikelets very shortly pedicellate and not numerous, divaricate or reflexed, very flat, 4 to 8 in. long, nearly 2 lines broad with 20 to 50 flowers, the rhachis tardily articulate. Glumes rather broad, very thin, closely distichous, enveloped at the base in woolly hairs. Palea nearly as long, the keels ciliate with soft hairs near the base. Stamens 3, with rather long anthers. Grain globular.

**N. S. Wales.** Darling River, *Mrs. Forde*.

**Central Australia.** Lake Eyre, *Andrews*; Charlotte Waters and towards West Australia, *Giles*.

15. *E. eriopoda*, Benth.—Stems 1 to  $1\frac{1}{2}$  ft. high, somewhat bulbous and densely woolly at the base. Leaves very narrow, short, the lower sheaths pubescent or hirsute. Panicle in some specimens reduced to an interrupted spike, in others divided into spreading branches. Spikelets nearly sessile, scattered or in pairs, very flat, 3 to 9 lines long, above 1 line broad, with 10 to 30 or more flowers. Glumes closely distichous but rather spreading, obtuse, almost hyaline with a dark green nerve on each side, glabrous. Palea as long. Stamens 2 only in all the flowers examined, with rather large anthers.

**N. Australia.** Cygnet Bay, N. W. coast, *A. Cunningham*; Dampier's Archipelago, *Walcott*.

16. *E. chætophylla*, Steud. *Syn. Glum.* i. 279.—Stems from a shortly thickened almost bulbous slightly woolly-hairy base densely tufted, slender but rigid, 6 in. to 1 ft. high, often leafy to the inflorescence. Leaves very narrow, convolute or setaceous, glabrous. Panicle narrow,  $1\frac{1}{2}$  to 3 in. long, shortly branched. Spikelets usually rather numerous, shortly pedicellate, scattered or crowded, flat and thin, 2 to 4 or rarely 6 lines long, 1 to  $1\frac{1}{4}$  lines broad, 6- to 30-flowered.



Glumes closely distichous or rather loose,  $\frac{1}{2}$  line long, obtuse or almost acute, hyaline or purplish, the lateral nerve prominent on each side at the base. Palea nearly as long, glabrous. Stamens 3. Grain small, ovoid-oblong.—*E. setifolia*, Nees in Hook. Lond. Journ. ii. 419, not of Benth.; *Poa diandra*, F. Muell. Rep. Babb. Exped. 21, not of R. Br.

**N. Australia.** Cygnet Bay, N. W. Coast, *A. Cunningham*.

**Queensland.** Mitchell District, *Birch*.

**N. S. Wales.** Plains of the Lachlan and Darling, *A. Cunningham*, *Mitchell*, *Burkitt*.

**S. Australia.** Cudnaka and Murray River, *F. Mueller*; Sturt's Creek, *Bebbage's Expedition*; Charlotte Waters, *Giles*; Lake Eyre, *Andrews*.

**W. Australia.** Murchison River, *Oldfield*; Fraser's Range, *Dempster*.

Var. *pauciflora*. Spikelets small, few-flowered, most of them however imperfectly developed in the specimens seen.—Lake Eyre, *Andrews*.

SECT. III. CYLINDROSTACHYA.—Spikelets very narrow, terete or nearly so, the rhachis scarcely or tardily articulate. Glumes closely appressed. Palea usually persistent.

17. **E. lacunaria**, *F. Muell. Herb.*—Stems slender, almost filiform but rigid, 6 in. to 1 ft. or rarely  $1\frac{1}{2}$  ft. high, the base sometimes almost bulbous but glabrous. Leaves very narrow, almost setaceous, usually short. Panicle loose, 2 to 4 in. long, with short spreading rather rigid branches. Spikelets few on the branches, shortly pedicellate, very narrow, 3 to 6 lines long, 10- to 24-flowered, terete or very slightly flattened. Flowering glumes closely appressed, broad, obtuse, scarcely  $\frac{3}{4}$  line long, usually purple, keeled, but the lateral nerves very faint or obsolete, the rhachis scarcely articulate. Palea nearly as long.

**Queensland.** Gracemere, *O'Shaughnessy*; near the Barcoo, *Birch*; Darling Downs, *Laic*; also in *Mitchell's* subtropical collection.

**N. S. Wales.** Mount Murchison, *Dallauchy*.

**S. Australia.** Morunda, Murray River, *F. Mueller*; Lake Eyre, *Andrews*.

With the habit and inflorescence nearly of *E. chaetophylla*, this has the spikelets rather of *E. falcata*.

18. **E. falcata**, *Gaudich. in Freye. Voy. Bot.* 408, t. 25.—A slender tufted glabrous grass, varying from a few inches to about 1 ft. high. Leaves narrow, convolute, erect. Panicle narrow, usually secund, slightly compound, 2 to 4 in. long. Spikelets sessile or nearly so, crowded or clustered along the short branches, very narrow, nearly terete, often curved, from  $\frac{1}{4}$  or  $\frac{1}{2}$  lines to 1 in. long and about  $\frac{1}{2}$  line broad, with 12 to 50 or even more flowers, the rhachis scarcely articulate. Flowering glumes closely appressed, scarcely 1 line long, obtuse, hyaline at the end, the keel and a lateral nerve on each side very prominent. Palea rather shorter, curved, persistent. Styles slender. Grain ovate, flattened.—*Poa falcata*, *Gaudich. l. c.*

**Queensland.** Mitchell District, *Birch*.

**N. S. Wales.** From the Lachlan and Darling to the Barrier Range, *Victoria Expedition* and many others.

**Victoria.** Wimmera, *Herb. F. Mueller*.

**S. Australia.** Morunda on the Murray, *F. Mueller*; Alice Springs and Charlotte Waters, *Giles*; Lake Eyre, *Andrews*.

**W. Australia.** Sharks Bay, (*Gaudichaud*); Swan River, *Drammond*, 1st coll., also n. 149, 974, 975; Murchison River, *Oldfield*; Fraser's Range, *Dempster*.

Some depauperate dwarf specimens from the Darling, *Mrs. F. v. d. H.* have the panicle reduced to 1 to 3 or 4 very long attenuated spikelets, but the structure is the same.

19. ***E. stenostachya***, *Steud. Syn. Glum.* i. 279.—Stems above 1 ft. high, slender. Leaves very narrow, glabrous. Panicle with few horizontally divaricate slender but rigid branches. Spikelets sessile or nearly so, scattered or clustered, horizontally divaricate or reflexed, about 3 lines long, very narrow, acute, almost terete, glabrous, 8- to 10-flowered, the rachis not articulate. Flowering glumes closely appressed, rather obtuse, thin almost hyaline, the nerves scarcely conspicuous. Palea rather shorter, very narrow.—*Poa stenostachya*, R. Br. Prod. 181.

**Queensland.** Endeavour River, *Banks and Solander*, a single specimen in Herb. Banks.

Var. ? *floribunda*. Leaves divaricate, 4 to 6 in. long, the orifice of the sheath bearded with a few long hairs. Panicle longer, with more numerous spikelets, but their shape and divaricate or reflexed position the same as in Banks's specimen.

**N. Australia.** Port Darwin, *Schultz*, n. 802.

## 92. POA, Linn.

Spikelets several- usually few-flowered, in a panicle usually loose and spreading rarely narrow and spikelike, the rachis of the spikelet articulate between the flowering glumes. Glumes keeled, unawned, the outer empty ones rather short, 1- or 3-nerved, sometimes acute, the flowering ones usually obtuse, 5-nerved, often surrounded by a few loose woolly hairs, rarely with 7 or more nerves. Palea nearly as long, prominently 2-nerved or 2-keeled. Grain enclosed in the glume and palea and falling off with them, but free or rarely adnate to the palea.

The genus is the most widely diffused over the globe in the whole Order, chiefly in temperate and cool regions, reaching the Arctic circle and Alpine summits. Of the eight Australian species one is a common European weed probably introduced, one or perhaps two are also in New Zealand, the remaining six or five appear to be endemic.

Perennials. Grain adhering to the palea.

Panicle narrow and dense, the spikelets crowded. Rigid maritime grass

Panicle small and loose. (Plant imperfectly known) . . . 1. *P. Billardieri*.

Perennials. Grain enclosed in the glume and palea but free from them.

2. *P. homomalla*.

Leaves setaceous or rigid and convolute or flat ending in long points. Panicle dense and contracted or spreading. Spikelets usually 4- to 6-flowered. Glumes and palea glabrous or with woolly hairs at the base . . . 3. *P. cæspitosa*.





- Leaves convolute. Panicle loose with long capillary branches. Spikelets 2- or 3-flowered . . . . . 4. *P. Maxwelli*.  
 Leaves flat, narrow, acuminate. Panicle rather dense. Spikelets 5- to 8-flowered, the keels of the glumes ciliate-pubescent. Stems knotty at the base . . . . 5. *P. nodosa*.  
 Leaves flat, rigid, obtuse or acute. Panicle spikelike but loose. Spikelets 3- or 4-flowered, glabrous . . . . 6. *P. saxicola*.  
 Annuals. Leaves flat, flaccid.  
 Panicle loose. Spikelets 2 lines long. Flowering glumes 5-nerved, glabrous or minutely silky hairs . . . . 7. *P. annua*.  
 Panicle narrow. Spikelets clustered, 3 lines long. Flowering glumes 7- to 11-nerved, the keel ciliate at the base with long hairs . . . . . 8. *P. lepida*.

1. **P. Billardieri**, *Steud. Syn. Glum.* i. 262.—A rigid erect maritime grass, much branched at the base, from under 1 ft. to 3 ft. high. Leaves terete often slender but rigid, smooth, often exceeding the panicle. Panicle dense and narrow though often much branched, about 2 in. long in the smaller specimens, 6 to 8 in. in the larger ones, with erect branches. Spikelets crowded, erect, mostly about 3 lines long, 4- to 6-flowered. Flowering glumes surrounded by a few fine woolly hairs, nearly 2 lines long, firm and straw-coloured when fully out, obtuse or slightly notched, 5-nerved but one of the nerves on each side often very faint, the keel ciliate below the middle. Grain broadly furrowed next to the palea and adnate to it when ripe.—*Arundo poeiformis*, Labill. Pl. Nov. Holl. i. 27, t. 35; *Poa australis* var. *Billardieri*, Hook. f. Fl. Tasm. ii. 123.

**N. Australia.** Cygnet Bay, N. W. Coast, *A. Cunningham*.

**Tasmania**, *Labillardière*, and some others.

**W. Australia**, *Drummond*; South West Bay, *A. Cunningham*.

In flower this species is difficult to distinguish from some specimens of the typical form of *P. caespitosa*, though it has generally a denser more erect panicle, with more pubescent spikelets, but the grain when ripe is very different. It is possible that some of the specimens I have included in *P. caespitosa*, having seen them in flower only, may belong to *P. Billardieri*, especially some of the maritime ones from Lord Howe's Island; and some from Portland in Victoria.

2. **P. homomalla**, *Nees in Pl. Preiss.* ii. 104.—A grass of 1 ft. or more, the stems nearly simple. Leaves flat, 1 line broad, with very flat striate sheaths, the ligula conspicuous. Panicle narrow, loose, 1 to 2 in. long with erect flexuose rather rigid secund branches, the lower ones divided. Spikelets about 1 line long, 2- or 3-flowered. Outer glumes glabrous, flowering glumes silky-glabrous, rather obtuse, 5-nerved. Grain adnate to the palea and glume.

**W. Australia.** Toolyay Valley, *Preiss.* ii. 1829. The only specimen I have seen is too imperfect for description, and the above character is taken chiefly from *Nees*. Some imperfect specimens from Kari Dala, *Hook.* may belong to the same species, but the grain is not yet sufficiently formed to determine them.

3. **P. caespitosa**, *Forst.; Spreng. Mant.* i. Fl. Hal. 33, and in *Mem. Acad. Petersb.* ii. (1807-8), 302, t. 8.—An exceedingly variable



species from under 1 ft. to 3 ft. high, usually densely tufted and glabrous. Leaves narrow, flat convolute or setaceous, chiefly at the base, sometimes longer than the inflorescence, sometimes very short, the ligula always very short or obsolete. Panicle branched, compact or spreading. Spikelets usually 4- to 6-flowered. Flowering glumes usually surrounded by a few fine woolly hairs but sometimes the whole spikelet glabrous, the cilia of the palea-keels when present very minute. Grain oblong, usually narrow, enclosed in the glume and palea but free from them.—*P. australis*, *P. laevis*, *P. plebeia* and *P. affinis*, R. Br. Prod. 179; *P. australis*, Hook. f. Fl. Tasm. ii. 123, except the var. *a*.

**Queensland.** Only known from the districts bordering on N. S. Wales, *Barker, Bailey*.

**N. S. Wales, Victoria, Tasmania, and W. Australia.** Appears to be abundant in the settled and moister or richer districts of these colonies, from whence we have specimens from stations far too numerous to particularise, but I have seen scarcely any from the desert interior. The species is also in New Zealand.

The variations of the species are very great and it is difficult to combine them all into a single one, yet they appear to be so closely connected by numerous intermediates, that precise characters cannot be given to the different forms, of which the following are the most prominent.

The typical form, agreeing fairly with Sprengel's figure and description (taken it is said from a New Zealand specimen of Forster's), is well represented by some specimens from Lord Howe's Island, *Feltgen*, with tall leafy stems, the long convolute smooth leaves exceeding the panicle. Glumes about 2 lines long. These specimens approach in habit the *P. Billardieri*, but in the few seedling ones seen the grain is certainly narrow and free.

**Var. *plebeia*.** Tall and leafy. Leaves narrow, flat or more or less convolute. Panicle exceeding the leaves, rather large and loose. Glumes 2 to 2½ lines long, usually surrounded by a few woolly hairs.—*P. plebeia*, R. Br.; Nees in Pl. Preiss. ii. 105. Chiefly in N. S. Wales and in W. Australia (*P. Preiss. a*, 1850, *D. n. n. n. n.*, 449 partly; Port Jackson, *R. Brown*).

**Var. *serpentina*.**—Like the var. *plebeia* or the var. *affinis*, but the rachis of the spikelet and base of the glumes perfectly glabrous.—*P. serpentina*, Nees in Pl. Preiss. ii. 106.—Apparently common in W. Australia.

**Var. *latifolia*.** Very tall and luxuriant, with flat leaves often 2 to 4 lines broad.—A very few specimens from Illawarra, *J. Thomson*, and Mungyong Mountains, *F. Mueller*.

**Var. *laevis*.** Leaves, when most characteristic, rigid, erect, terete, smooth and shining, and the panicle contracted, but in many specimens the leaves more slender and sometimes filiform as in the var. *australis*, but always quite smooth, the stem then taller and the panicle more diffuse. Glumes usually about 1½ lines long.—*P. laevis*, R. Br.; Nees in Pl. Preiss. ii. 275; *P. affinis*, Nees, l. c. 105.—Numerous specimens chiefly from the southern colonies, (*P. Preiss. a*, 1830, 1857, *D. n. n. n. n.*, 168 and 449 partly; Kent's Group and King George's Sound, *R. Brown*.)

**Var. *alpina*.** F. Muell. A dwarf tufted form, with the rigid smooth leaves of the var. *laevis* and the short loose panicles of some specimens of the var. *australis*.—Mount Wellington in Tasmania. *Gunn, Oldfield*.

**Var. *affinis*.** Leaves very narrow but often flat as in the var. *plebeia*, but the panicle more diffuse, with more numerous smaller spikelets, the glumes usually under 1½ lines long.—*P. affinis*, R. Br. One of the commonest forms in the eastern colonies



but passing much into the smooth *P. australis* and into *P. laevis*, in W. Australia often losing the woolly hairs of the spikelet and passing into *P. serpentum*, (Port Jackson, *R. Brown* ; W. Australia, *Drummond*, n. 981, etc.)

*Var. australis.* Leaves mostly radical, setaceous, much shorter than the stem, erect and exceedingly scabrous. Stems under 1 ft. high with a very loose spreading rather small panicle. Glumes 1 to  $1\frac{1}{2}$  lines long.—*P. australis*, *R. Br.* Prod. 179 ; *Nees* in *Sieb. Agrost.* n. 77 ; *P. Sieberiana*, *Spreng.* Syst. Cur. Post, 35 ; *P. implexa*, *Trin.* in *Mem. Acad. Petersb.* ser. 6. i. 288. Tasmania, very abundant (*R. Brown*, etc.) as above described. In Victoria and N. S. Wales the radical leaves are generally longer and the stem taller ; in the northern districts is a common form with very long scabrous filiform leaves, and in N. S. Wales, Victoria and S. Australia it passes frequently into *P. affinis*. In Tasmania and Victoria is a not uncommon form with the habit and setaceous leaves of the typical one but perfectly smooth. *P. porphyroclados*, *Nees* in *Pl. Preiss.* ii. 105, from W. Australia, would from his character be the true *P. australis*, but I have seen no western specimens with setaceous very scabrous leaves.

*Var. tenera.* A slender weak variety, with very narrow or filiform but flaccid leaves, and a loose spreading rather small panicle with small spikelets, the glumes scarcely 1 line long.—*P. tenera*, *F. Muell.* in *Hook. f. Fl. Tasm.* ii. 124, t. 164 ; *P. affinis*, *Steud.* Syn. Glum. i. 262. Woods and shady places, N. S. Wales, Victoria and Tasmania.

4. *P. Maxwelli*, *Benth.*—An erect tufted glabrous smooth and shining grass of 2 or 3 ft. or more. Leaves long, convolute, almost subulate. Panicle from a few inches to 1 ft. long, narrow but very loose, the long capillary branches more or less divided, the lower ones in distant clusters, the upper ones scattered. Spikelets very shortly pedicellate along the branches, scarcely 2 lines long, glabrous, 2- or 3-flowered. Flowering glumes rather broad, very obtuse, 5-nerved, with scarious entire or denticulate tips. Palea nearly as long and rather broad, glabrous. Stamens 3. Grain oblong, free.

**W. Australia.** King George's Sound, *Maxwell*.

5. *P. nodosa*, *Nees* in *Pl. Preiss.* ii. 105.—Stems usually about 2 ft. high, forming at the base 1, 2 or 3 superposed globular or ovoid nodules, 3 or 4 lines diameter. Leaves long, narrow, flat, usually scabrous. Panicle loose, narrow or spreading. Spikelets 3 to 4 lines long, 5- to 8-flowered, rather narrow at first with closely appressed glumes, at length broad and flat, the glumes spreading out. Flowering glumes about 2 lines long, 5-nerved, without the woolly hairs at the base of most *Poa*, but shortly ciliate-pubescent on the keel and margins below the middle. Palea nearly as long, the keels minutely ciliate-pubescent or glabrous. Grain free.—*F. Muell.* *Fragm.* viii. 132 ; *P. brizachloa*, *F. Muell.* in *Trans. Vict. Inst.* 1855, 45 ; *P. Drummondiana*, *Nees* in *Hook. Lond. Journ.* ii. 418 ; *P. cognata*, *Steud.* Syn. Glum. i. 262.

**S. Australia.** Lofty Ranges and other localities from St. Vincent's Gulf to the Murray, *F. Mueller*.

**W. Australia.** Swan River, *Oldfield*, *Drummond*, n. 169 and 398 or 399 ; Champion Bay and Gordon River, *Oldfield* ; near Limekiln, *Preiss*, n. 1852 ; West Bay, *Maxwell*.

When fully out the spikelets are broad almost like those of a *Briza*, but in many specimens both from S. and West Australia they are lanceolate close and rather thick, but apparently the difference is owing to a different stage of development rather than to any distinction of race.

6. **P. saxicola**, *R. Br. Prod.* 180.—A glabrous perennial, 1 to 1½ ft. high. Leaves few, flat, rigid, acute or almost obtuse, 1 to 2 lines broad, the upper ones small and distant with long sheaths. Panicle on a long peduncle, very narrow, with few erect branches. Spikelets few, oblong, about 3 lines long, 3- or 4-flowered, the rachis glabrous. Flowering glumes broad, rather obtuse, about 1½ lines long, closely imbricate, minutely ciliate, the keel rather prominent, the lateral nerves very faint, 2 on each side. Grain not seen.—Hook. f. *Fl. Tasm.* ii. 125, t. 164.

**Tasmania.** Summit of Mount Wellington, *R. Brown, Guss.* Apparently a very distinct species more nearly allied to *P. a. Less.* than to *P. aspitosa*, but I have only seen the specimen figured by J. D. Hooker and two in Herb. R. Brown.

\* 7. **P. annua**, *Lin.*; *Kunth, Enum.* i. 349.—A tufted annual, often only 2 or 3 in., and rarely 1 ft. high. Leaves flat, flaccid. Panicle loose and spreading. Spikelets shortly pedicellate, about 2 lines long, 3- to 6-flowered, the rachis glabrous. Flowering glumes more or less distinctly 5-nerved, with a hyaline apex, the keel often minutely silky-hairy. Grain free, oblong.

A common grass in the northern hemisphere, now a naturalised weed in various countries, said to be abundant in **Victoria**, **Tasmania**, **S. Australia**, and **W. Australia**, as well as in several stations in **N. S. Wales** and in Lord Howe's Island.

8. **P. lepida**, *F. Muell. Fragm.* viii. 130.—An erect annual, varying from 2 or 3 in. to nearly 1 ft. high, more slender and less spreading than *P. annua*. Leaves flat, flaccid, the ligula rather long, jagged. Panicle very narrow, almost spikelike, 1 to 2 in. long. Spikelets not numerous, nearly sessile, clustered on the very short branches, very flat, about 3 lines long, 5- to 7- or more-flowered, the rachis more or less silky-hairy. Flowering glumes narrow, obtuse, nearly 1½ lines long, 7- to 11-nerved, the keel prominent, ciliate with long hairs below the middle; outer glumes 3-nerved. Grain apparently broader than in most *Poa* and broadly furrowed, but not seen ripe.

**N. S. Wales.** Murray and Darling Rivers, *Victorian Expedition*; Lachlan and Darling Rivers, *Burkitt*.

**S. Australia.** Crystal Brook, *F. Mueller*, near Lake Greenley, *Wilhelmi*.

### 93. SCHEDONORUS, Beauv.

Spikelets several-flowered, flattened, in a narrow and spikelike or loose and spreading panicle, the rachis of the spikelet glabrous or





slightly hairy, articulate under the flowering glumes. Outer empty glumes narrow, acute, keeled or 3-nerved. Flowering glumes usually 5-nerved, rounded on the back at the base, obtuse or shortly notched at the apex, the keel prominent at least in the upper part and usually produced into a minute point in or just below the notch. Palea nearly as long, usually rather broad prominently 2-nerved. Styles distinct, slightly excentric. Grain very obtuse, usually broadly furrowed, free from the palea.

The genus comprises several species, chiefly from the temperate regions of the northern or the southern hemisphere; its limits are however as yet very unsettled. Of the three Australian species, one is also in New Zealand, the other two appear to be endemic. The name of the genus is frequently spelt by mistake *Schedon*, even in Beauvois' own Index, but the etymology given shows that the spelling *Schedonorus*, as given in the text p. 99 is the correct one. Fries and other modern botanists have given the genus a different signification from that originally contemplated by the author, including species which have the habit and characters rather of *Bromus*. As here understood, it differs from *Bromus* in the glabrous ovary, from *Festuca* in the flowering glume and from both in the free grain, in which it approaches *Poa* and *Alpestris*, but differs in the flowering glume and grain and somewhat in habit.

Panicle narrow, dense and spikelike or interrupted.

Leaves none except sheathing scales at the base of the stem . . . . .

1. *S. scirpoideus*.

Leaves long erect and rigid . . . . .

2. *S. littoralis*.

Panicle loose and spreading . . . . .

3. *S. Hookerianus*.

(See also *Poa Billardieri*, which has the grain furrowed as in *Schedonorus*.)

1. ***S. scirpoideus*, Benth.**—Stems rushlike, terete, rigid, 2 to 4 ft. high, leafless except membranous closely appressed sheathing scales at the base, the longest inner one 6 to 8 in. long. Panicle narrow and spikelike but interrupted, 2 to 8 in. long. Spikelets pedicellate, 2 or 3 together on very short erect branches or the upper ones solitary, flat, oval or oblong, 4 to 5 lines long, 6- to 8-flowered. Glumes straw-coloured or pale-brown, rigid, about 3 lines long, the flowering ones obtuse or slightly notched with the keel produced into a short point in some specimens, not protruding in others, the 2 outer empty ones more acute and keeled from the base. Ovary glabrous. Styles rather longer with darker coloured stigmas than in most *Festuceæ*. Grain free and furrowed, but not seen ripe.—*Brizopyrum scirpoideum*, Steud. Syn. Glum. i. 282; *Festuca scirpoidea*, F. Muell. Fragm. viii. 129.

**W. Australia, Drummond**, n. 102, 156.

2. ***S. littoralis*, Beauv. Agrost. 99.**—Stems 1 to 3 ft. high, forming dense hard tufts of a pale yellow colour. Leaves nearly cylindrical, erect, rigid, pungent-pointed, glabrous, often as long as the stems. Panicle narrow, dense and spikelike, 2 to 4 in. long. Spikelets few, flat, erect, 7 to 9 lines long, 6- to 8-flowered. Glumes about 4 lines long, rigid, straw-coloured, the flowering ones with 2 nerves on each side of the keel, acute or dilated and notched at the tip, the keel usually slightly protruding, the 2 outer empty ones narrower, 3-nerved, acute.



Rhachis of the spikelet shortly hairy.—*Festuca littoralis*, Labill. Pl. Nov. Holl. i. 22, t. 27; R. Br. Prod. 178; Hook. f. Fl. Tasm. ii. 128; Sieb. Agrostoth. n. 58; *Arundo triodioides*, Trin. Spec. Gram. t. 351. *Schedonorus Billardierianus*, Nees in Hook. Lond. Journ. ii. 419.

**Queensland.** Moreton Island, *F. Mueller*.

**N. S. Wales.** Port Jackson, *R. Brown*, *Woolfs*; also in *Leichhardt's* collection.

**Victoria.** Sea-shore, Port Phillip, *Adamson*; *Wilson's Promontory*, *F. Mueller*.

**Tasmania.** *Labillardiere*; abundant on rocks and sandhills near the coast. *J. D. Hooker*; *King's Island*, *Neate*.

**S. Australia.** Lake Alexandrina, *F. Mueller*.

Var. *triticoides*. Stems taller and spikelets larger than in the typical form. Glumes about  $\frac{1}{2}$  in. long, the outer empty ones often 5-nerved and the flowering ones 7-nerved.—*Festuca triticoides*, Steud. Syn. Glum. i. 315.

**W. Australia.** *Drummond*, n 70, 150, 377, 393.

**3. S. Hookerianus**, *Benth.*—A stout perennial of 2 to 4 ft., glabrous or slightly scabrous-pubescent. Leaves flat, rather long. Panicle very loose, 6 in. to 1 ft. long, with rather short and erect or long and spreading branches. Spikelets numerous, 4 to 5 lines long, 4- to 6-flowered. Flowering glumes rigidly membranous, about 3 lines long, keeled only in the upper part, the tip hyaline, entire or notched, the keel produced into a short point; outer glumes shorter, unequal, prominently keeled, the 2nd often 3-nerved.—*Festuca Hookeriana*, *F. Muell.* in Hook. Fl. Tasm. ii. 127, t. 155; *Poa Hookeriana*, *F. Muell.* Fragm. viii. 131.

**Victoria.** Berrima and Cobberas Mountains, Australian Alps, *F. Mueller*; cultivated at Ballarat, *Bacchus*.

**Tasmania.** Cheshunt, *Archer*; Meander River, *C. Stuart*.

## 94. GLYCERIA, R. Br.

Spikelets several-flowered, pedicellate in a narrow or spreading panicle, the rhachis of the spikelet articulate under the flowering glumes, glabrous or rarely hairy. Outer empty glumes obtuse or acute, unawned. Flowering glumes convex on the back, 3- to 9-nerved, the nerves not reaching to the hyaline obtuse sometimes slightly denticulate apex. Palea nearly as long as the glume. Ovary glabrous. Styles distinct, very short, the plumose stigmas frequently more branched than in other genera. Grain glabrous, enclosed in the glume and palea but free from them.

The genus is widely distributed over the temperate and some warmer regions of the globe. Of the seven Australian species, one has an extensive range in the northern hemisphere both in the New and the Old World, one extends to New Zealand, the remaining five appear to be endemic.







Brown called attention to two remarkable characters in the typical species, the union of the two lodicules, and the ramification of the stigmatic hairs, which are most marked in the *G. fluitans* and exist to a certain degree in some other species. They are however, as far as has been observed, not constant in all the species which have been included in the genus, which requires further revision in connection with some closely allied ones from the northern hemisphere.

- Flowering glumes with a tuft of hairs round the base or on the back below the middle. Panicle loose . . . 1. *G. Fordeana*.  
 Rhachis and base of the flowering glumes glabrous or minutely pubescent.  
 Stems rarely 3 ft. high. Panicle narrow.  
 Panicle long and loose. Spikelets  $\frac{1}{2}$  to 1 in. Flowering glumes distant, narrow, 3 lines long, outer glumes much shorter . . . 2. *G. fluitans*.  
 Panicle dense. Spikelets few, broad,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. Flowering glumes paleaceous, 3 to 4 lines long, outer glumes as long . . . 3. *G. latispica*.  
 Panicle dense. Spikelets numerous, narrow, 3 to 4 lines. Flowering glumes  $1\frac{1}{2}$  lines long . . . 4. *G. stricta*.  
 Stems 6 to 12 ft. high, stout, with long leaves. Panicle long and loose. Spikelets numerous, 3 to 4 lines long . . . 5. *G. dives*.  
 Stems very rigid, tall with few short leaves and often clusters of short branches. Flowering glumes hyaline, 3-nerved at the base.  
 Panicle very spreading. Spikelets 6- to 12-flowered. Eastern species . . . 6. *G. ramigera*.  
 Panicle oblong, erect. Spikelets numerous, 4- to 6-flowered. Western species . . . 7. *G. australasica*.

1. *G. Fordeana*, *F. Muell. Fragm.* viii. 130.—An erect glabrous grass attaining 2 or 3 ft. Leaves flat, very scabrous. Panicle very loose, compound, 4 to 8 in. long, with very spreading capillary branches, mostly in pairs or threes. Spikelets lanceolate, mostly 4 to 5 lines long, 8- to 12-flowered. Outer glumes acute, 3-nerved: flowering glumes 5- or 7-nerved,  $1\frac{1}{2}$  lines long, surrounded by a tuft of hairs and shortly hairy or pubescent in the lower part, the midrib prominent but not reaching the obtuse hyaline apex, the lateral nerves shorter. Palea-keels scarcely ciliate.—*Poa Fordeana*, *F. Muell.* l. c.

**N. S. Wales.** Darling River, *Mrs. Forde*; Lachlan River, *Buckitt*; Mount Murchison, *Bonney*.

**Victoria.** Murray River, *F. Mueller*; Wimmera, *Wilson*.

2. *G. fluitans*, *R. Br. Prod.* 179.—Stems creeping in mud or floating at the base, ascending to 2 or 3 ft. Leaves narrow, flat, glabrous, the ligula jagged. Panicle loose, long and narrow. Spikelets solitary in the distant notches or 2 or 3 on a short branch from the same notch, erect, narrow,  $\frac{1}{2}$  to 1 in. long, 6- to 20-flowered, the rhachis glabrous as well as the glumes. Outer glumes broad, obtuse, hyaline, faintly nerved at the base, the lowest about  $1\frac{1}{2}$  lines, the 2nd longer; flowering glumes more rigid, about 3 lines long, with about 7 nerves not reaching to the hyaline obtuse entire or slightly denticulate apex.

Lodicules usually connate.--Hook. f. *Fl. Tasm.* ii. 122; Reichb. Ic. *Fl. Germ.* t. 80; *Festuca fluitans*, Linn.; *F. Muell. Fragm.* viii. 129.

**N. S. Wales.** Port Jackson, *R. Brauer, Walls*; New England, *Leichhardt*.

**Victoria.** Black Forest, Curdie's River, Mitta-Mitta, Loddon, etc., *F. Muell.*; Ballarat, *Bacchus*.

**Tasmania.** Common in wet places, *J. D. Hooker*.

**W. Australia.** *Perroteranthus Drummondii*, Steud. *Syn. Glum.* i. 287, from *Drummond's* collection, n. 390 and 977 (277 in Herb. Hook.), appears to be a variety or small leafy state of *G. fluitans*, with the flowering glumes more distant than usual along the rhachis.

The species is abundant in the northern hemisphere, in the New as well as the Old World.

**3. *G. latispicea*, *F. Muell. Fragm.* viii. 127.**—Stems erect, attaining 2 or 3 ft. Leaves flat, glabrous, the ligula long and jagged. Panicle narrow, the branches very short, erect, each bearing 1 to 3 spikelets, the lower ones distant. Spikelets rather broad and loose,  $\frac{1}{2}$  in. long or rather more, pale-coloured, 6- to 12-flowered, the rhachis as well as the glumes glabrous or very minutely hairy. Outer glumes obtuse, 5-nerved; flowering ones 3 to 4 lines long, 7- or 9-nerved, rounded on the back as in the rest of the genus but the midrib reaching the obtuse hyaline apex, the lateral nerves faint and shorter. Grain oblong, flattened but concave on the inner face. — *Festuca latispicea*, *F. Muell. l. c.*

**N. S. Wales.** Gwidir River and Myall Creek, *Leichhardt*; New England, *C. Stuart*. The specimens seen are few and the species requires further elucidation. It seems in some respects to approach *Schedonorus*, and the grain is rather narrower than in most *Glyceria*, but not seen quite ripe.

**4. *G. stricta*, *Hook. f. Fl. Nov. Zel.* i. 304, *Fl. Tasm.* ii. 123, t. 162.**—A tufted glabrous erect annual of 1 to  $1\frac{1}{2}$  ft. Leaves very narrow, erect, with broad loose sheaths. Panicle narrow, 3 to 6 in. long, the branches clustered, erect or at length spreading, the lower ones often long. Spikelets narrow, 3 to 4 lines long, 5- to 8-flowered, the rhachis glabrous as well as the glumes. Outer glumes unequal, 3-nerved, flowering glumes  $1\frac{1}{2}$  lines long, 5-nerved, none of the nerves reaching the obtuse hyaline apex. Lodicules distinct, exceedingly thin and delicate. Grain concave on the inner face.—*Poa syrtica*, *F. Muell. in Trans. Vict. Inst.* 1855, 45; *Festuca syrtica*, *F. Muell. Fragm.* viii. 130.

**Victoria.** Marshy ground, Melbourne, *Adamson*.

**Tasmania.** Marshes, Launceston, *Gunn*.

**S. Australia.** Sandy shores of Spencer's and St. Vincent's Gulfs, *F. Muell.*

**W. Australia,** *Drummond*, n. 60, 150, 219; Busselton, *Pries* (with the spikelets almost sessile and crowded on the short branches).

*G. tenuispica*, Steud. *Syn. Glum.* i. 285, is founded on small specimens of *Drummond's*, n. 347, in fruit with many of the branches spreading and several of the fruits fallen away.

The species is also in New Zealand.







5. **G. dives**, *F. Muell. Herb.*—A stout erect glabrous grass attaining 10 to 12 feet. Leaves flat, long and broad or narrow, with long loose sheaths. Panicle very loose and spreading, 6 in. to 1 ft. long, with long capillary branches. Spikelets 4 to 5 lines long, 4- to 6-flowered, the rhachis glabrous. Outer glumes acute, prominently 3-nerved, the longest about 2 lines long; flowering glumes nearly 3 lines long, broad, with 5 prominent scabrous nerves, not reaching the hyaline tip, the margins as well as the keels of the palea shortly ciliate. Lodicules slightly united at the base.—*Festuca dives*, *F. Muell. Fragm. iii. 147, viii. 129.*

**Victoria.** Upper Yarra, Dandenong Range, Bunip Creek, *F. Muell.*

6. **G. ramigera**, *F. Muell. Fragm. viii. 131.*—A tall glabrous rigid almost Bamboo-like grass, branched at the base and often bearing clusters of branches higher up. Leaves convolute and flat, few and short on the flowering stems. Panicle 4 to 8 in. long, loosely ovate or at length very spreading. Spikelets rather numerous, usually 3 to 5 lines long with 6 to 12 flowers, but sometimes longer, the rhachis glabrous. Outer glumes narrow, hyaline, acute, faintly 1-nerved; flowering glumes distant, about  $1\frac{1}{2}$  lines long, broad and concave, hyaline, 3-nerved, the nerves all short, the central one not reaching much above the middle. Grain not seen ripe but apparently that of *Glyceria*.—*Poa ramigera*, *F. Muell. in Trans. Viet. Inst. 1855, 45 and Fragm. l. c.*

**N. S. Wales.** Lachlan River, *A. Cunningham*; Molle's Plains, *Fraser*; Murrumbidgee and lower Darling Rivers, *Victorian and other Expeditions.*

**Victoria.** Wimmera, *Wilson* (a very poor specimen).

**S. Australia.** Murray River, *F. Mueller.*

7. **G. australasica**, *Steud. Syn. Glum. i. 286.*—Stems rigid, erect, glabrous, many feet high. Leaves few short and erect, mostly leaving sheaths only at the time of flowering. Panicle narrow, 3 to 4 in. long with numerous erect slender branches, like that of a *Triodia*. Spikelets erect, narrow, terete, 3 to 4 lines long, 4- to 6-flowered, the rhachis glabrous. Glumes thin and hyaline, the outer ones short, nerveless or the 2nd 1-nerved; flowering glumes 1 to  $1\frac{1}{4}$  lines long, broad, obtuse or slightly jagged, 3-nerved at the base. Grain not seen.

**W. Australia.** *Drummond. n. 107, 387.* This and the preceding species may possibly prove to be varieties of one, but they appear to me to be distinct.

## 95. BRIZA, Linn.

Spikelets several-flowered, broad, flattened but thin, on filiform pedicels, in a simple or compound panicle, the rhachis of the spikelet glabrous. Flowering glumes imbricate but spreading, very broad, mem-

branous or scarious, very concave or inflated, unawned. Palea much smaller but very broad and flat. Grain obovate, concave in front, enclosed in the palea and almost vesicular glume, free from them.

A small genus widely spread in its typical form over the temperate regions of the northern and southern hemispheres, and as introduced weeds in some tropical countries, but in a more general sense including the South American genus *Chusquea*.

Panicle branched, rather loose and spreading. Spikelets scarcely

2 lines long and broad . . . . . 1. *B. minor*.

Panicle nearly simple with few spikelets  $\frac{1}{2}$  in. long and at least

4 lines broad . . . . . 2. *B. maxima*.

1. **B. minor**, Linn.; Kunth, *Enum.* i. 372.—An erect annual, from a few inches to about 1 ft. high. Leaves rather short, flat, the ligula scarious and often above 3 lines long. Panicle usually 2 to 3 in. long, much branched and at length spreading, with numerous thick spikelets about 2 lines long and as broad or at length broader.—Reichb. Ic. Fl. Germ. t. 92; F. Muell. *Fragm.* viii. 125; *B. virens*, Linn.; Nees in Pl. Preiss. ii. 107.

**N. S. Wales.** Port Jackson and various localities in the interior, R. Brown, Wools and others; Lord Howe's Island, *Fullagar*.

**Victoria.** Common about Melbourne, Ballarat, etc., F. Mueller, Adamson and others.

**Tasmania,** Gunn, C. Stuart, Story and others.

**S. Australia.** Around St. Vincent's and Spencer's Gulfs, F. Mueller.

**W. Australia.** Swan and Blackwood Rivers, *Oldfield*.

Probably of Mediterranean origin but now fully established in extratropical South America and Africa, and though of recent introduction in many parts of Australia, C. Stuart observes that it is found in very remote localities in Tasmania. It is not admitted in Hooker's Flora of Tasmania.

\* 2. **B. maxima**, Linn.; Kunth, *Enum.* i. 371.—An erect annual of 1 to 2 ft. Leaves flat, with a rather long ligula. Panicle almost simple, with few large hanging spikelets usually of a rich brown rarely pale green, mostly about  $\frac{1}{2}$  in. long, very obtuse, 4 to 5 lines broad.—Reichb. Ic. Fl. Germ. t. 92; F. Muell. *Fragm.* viii. 125.

A European species, not so widely spread as *B. minor*, but long since cultivated in gardens for ornament and now apparently established in a few localities in **N. S. Wales**, C. Moore, **S. Australia**, F. Mueller, and **W. Australia**, *Oldfield* and others.

## 96. BROMUS, Linn.

Spikelets several-flowered, oblong or lanceolate, pedicellate, erect or drooping, in a more or less branched panicle, the rhachis of the spikelet articulate between the flowering glumes, glabrous or scabrous-pubescent. Outer empty glumes acute or fine-pointed, unawned. Flowering glumes convex on the back, 5- or 7-nerved, the hyaline apex usually shortly bifid, the midrib produced into a straight or curved awn free from a little below the apex. Palea nearly as long as the glume,





the 2 prominent nerves usually scabrous-ciliate. Ovary obovate, crowned by a hairy membranous appendage, the very short distinct styles more or less lateral. Grain flattened, adhering to the palea, and often more or less to the base of the glume.

The genus is widely distributed over the temperate regions of the globe. Of the three species here enumerated two are probably introduced from Europe, one only appears to be truly indigenous, but is also in New Zealand, and is probably the same as an East Asiatic one.

- Spikelets thick, under  $\frac{3}{4}$  in. with the awns. Flowering glumes  
 oblong, turgid, closely imbricate . . . . . 1. *B. mollis*.  
 Spikelets lanceolate, flattened, 1 to  $1\frac{1}{2}$  in. long with the awns.  
 Flowering glumes narrow, loosely imbricate . . . . . 2. *B. arenarius*.  
 Spikelets linear-lanceolate, flattened, 2 in. long with the awns.  
 Flowering glumes narrow, loosely imbricate . . . . . 3. *B. sterilis*.

\* 1. *B. mollis*, Linn.; Kunth, Enum. i. 413.—An erect grass of 1 to 2 ft., more or less softly pubescent. Leaves flat. Panicle either small with few erect spikelets, or larger and at length drooping. Spikelets oblong or lanceolate,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long, not so flat as in the other species. Glumes mostly about 7-nerved but the nerves sometimes more in the flowering glumes, fewer in the outer ones, the flowering ones about 3 lines long, broad and almost turgid, the fine awn about the length of the glume itself.—Host. Gram. i. t. 19; Reichb. Ic. Fl. Germ. t. 74.

An European grass, now established in various localities in **N. S. Wales, Victoria and Tasmania**.

2. *B. arenarius*, Labill. Pl. Nov. Holl. i. 23, t. 28.—Apparently annual, from 1 ft. to about  $1\frac{1}{2}$  ft. high. Leaves flat, flaccid, softly hairy or pubescent. Panicle at first erect at length drooping, the capillary branches clustered, the longer ones 2 to 3 in. long with 1 to 4 spikelets on capillary pedicels. Spikelets lanceolate,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long without the awns, flat, 5- to 9-flowered. Glumes all pubescent or glabrous, the lowest about 3 lines long and 5-nerved, the 2nd longer and 7-nerved, both empty and acute; flowering glumes rather longer, about 7-nerved, convex on the back, the awn free from a little below the scarious tip,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long.—*B. australis*, R. Br. Prod. 178; Nees in Pl. Preiss. ii. 108.

**N. S. Wales.** Port Jackson, *R. Brown*, and thence in the interior to the Lachlan and Darling, *M'Arthur*, *Barkitt* and others; Castlereagh River, *Woods*; Macquarrie, *C. Moore*.

**Victoria.** Forest Creek, *F. Mueller*; Melbourne, *Adamsen*; Portland, *Allitt*; Murray River, *Gummon*.

**S. Australia.** St. Vincent's Gulf, *F. Mueller*, *Behr*; Mount Olga, *Giles*.

**W. Australia.** Swan River, *Oldfield*, *Draummond*, n. 127, 386, 389, 982, some specimens tall and nearly glabrous, others short and densely pubescent; Rottenest Island, *Preiss*, n. 1828, 1839.

Var. *macrostachya*. Spikelets 1 in. long, each with 15 to 20 flowers.—Yass in the interior of N. S. Wales, *M'Arthur*; Darling River, *Victorian Expedition*.



Munro thinks the species may be the same as the *B. japonicum*, Thunb. If this should be verified Thunberg's name would take precedence over Labillardière's.

\* 3. **B. sterilis**, Linn.; Kunth, *Enum.* i. 418.—An erect grass of 1 to 2 ft. Leaves flaccid, softly pubescent. Panicle loose with rather long erect at length drooping branches. Spikelets linear-lanceolate, mostly about 1 in. long without the awns, 6- to 8-flowered. Outer glumes narrow, ending in fine points, the lowest keeled, only  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long, the 2nd longer, 3-nerved. Flowering glumes mostly 5- or 7-nerved, the hyaline tips ending in 2 fine points. Awn much longer than the glume itself, very scabrous.—Reichb. *lc.* Fl. Germ. t. 73.

**N. S. Wales.** Paramatta, *Woolfs*.

**Victoria.** Yarra River, *F. Mueller*.

**Tasmania.** Swanport, *Stary*; Ravenswood, *Bissill*; King's Island, *Neate*.

A common grass in Europe, probably introduced from thence to the above Australian stations.

### \* 97. **CERATOCHLOA**, Beauv. and DC.

Spikelets several-flowered, flat, pedicellate, in a branched panicle, the rhachis of the spikelet articulate between the flowering glumes, glabrous. Glumes all complicate, keeled, several-nerved, entire, acute or the flowering ones tapering into a short awn. Palea nearly as long as the glume, prominently 2-nerved. Ovary crowned by a hairy 3-lobed or 3-horned appendage. Styles very short, attached at the base of the lobes. Grain oblong, adnate to the palea, the seed deeply furrowed.

An American genus of few species, of which the typical one (from which alone the above character is taken) has become introduced into Australia as in South Africa. Beauvois expressly states that the genus was concurrently established by De Candolle and himself.

\* 1. **C. unioides**, DC. *Cut. Hort. Monsp.* 92.—An erect grass of 2 ft. or more. Leaves more or less pubescent, with soft spreading hairs. Panicle loose, erect or at length drooping, like that of a *Bromus*. Spikelets lanceolate, resembling those of the North American *Uniola*,  $\frac{3}{4}$  to  $1\frac{1}{2}$  in. long, and the flowering glumes about  $\frac{1}{2}$  in.—*Festuca unioides*, Willd. *Hort. Berol.* 3, t. 3; *Bromus unioides*, H. B. and K.; Kunth, *Enum.* i. 415; *B. Willdenowii*, Kunth, *l. c.* 416; *Ceratochloa festucoides*, Beauv. *Agrost.* 75, 158, t. 15, f. 7.

An American plant, chiefly western, extending from Patagonia to British Columbia, now reported as naturalised in a few localities in **N. S. Wales**, **Tasmania**, and **S. Australia**, as in South Africa.

### 98. **FESTUCA**, Linn.

Spikelets several-flowered, pedicellate, in loose and spreading or compact and erect more or less one-sided panicles, the rhachis of the











spikelet articulate under the flowering glumes, glabrous or nearly so. Outer empty glumes narrow, acute, keeled, usually unequal. Flowering glumes narrow, acute or tapering into an untwisted awn or rarely obtuse, rounded on the back, faintly nerved. Palea narrow, with prominent nerves or keels. Ovary glabrous. Styles very short, distinct. Grain enclosed in the glume and palea and more or less adnate.

The genus is very generally spread over the globe especially in temperate or mountainous regions. Of the three following species one is introduced only from Europe, the other two are common northern ones found also in parts of the southern hemisphere.

F. Mueller, *Fragm.* viii. 127 et seq. unites *Agrypum*, *Triticum*, *Deplacum*, *Schedonorus* and *Glossaria* with *Festuca*, but he has not published his character for the composite genus thus formed, nor do I well see how it could be framed without including also *Triticum*, *Poa*, *Bromus* and several others universally acknowledged as distinct.

Annual. Panicle slender, contracted, one-sided. Awns long.

Stamen usually 1 only

1. *F. bromoides*.

Perennials. Panicle loose. Stamens 3

2. *F. duriuscula*.

Small rigid annual. Panicle-branches short, secund. Flower-

ing glumes obtuse, unawned

3. *F. rigida*.

1. **F. bromoides**, Linn.; *Kunth, Enum.* i. 396.—A slender tufted annual, from a few inches to above 1 ft. high. Leaves chiefly at the base, narrow and convolute, often quite setaceous. Panicle slender, one-sided, contracted, usually rather dense and 2 to 6 in. long, with short erect branches, in small specimens reduced to 2 or 3 spikelets. Spikelets shortly pedicellate, under  $\frac{1}{2}$  in. long without the awns, 5- to 9-flowered. Glumes very narrow, the lowest under 2 lines without lateral nerves, the 2nd empty one 3-nerved, tapering to a point or short awn; flowering glumes obscurely nerved, about 3 lines long, tapering into a fine awn at least as long as themselves. Stamen 1 only. Grain adnate, long and narrow.—Hook. f. *Fl. Tasm.* ii. 127; *F. plebeia*, R. Br. *Prod.* 178.

**Queensland.** Brisbane River, *Bailey*.

**N. S. Wales.** Port Jackson, *Woolfs*.

**Victoria.** Very common all over the Yarra Ridge, *F. Mueller*; Royston. *Southwestern*.

**Tasmania.** Table Mountain (Mount Wellington), *R. Brown*; abundant in dry pastures, etc., *J. D. Hooker*; King's Island, *M'Gowan*.

**S. Australia.** Round St. Vincent's Gulf, *F. Mueller*.

**W. Australia.** King George's Sound and neighbouring districts, *Oldfield*, *F. Mueller*, *Walcot*.

Common in the temperate regions of the northern hemisphere in the Old World and introduced into North America and some other countries. *F. agurua*, Linn., does not appear to me distinct as a species.

2. **F. duriuscula**, Linn.; *Kunth, Enum.* i. 399.—An erect perennial of 1 to 2 ft. Leaves chiefly at the base, very narrow, almost setaceous. Panicle loose but narrow, 2 to 4 in. long with few erect branches. Spikelets not numerous, erect, usually about  $\frac{1}{2}$  in. long, 4- to 6-flowered. Glumes rather rigid, the outer ones pointed, the lowest

very narrow, keeled, scarcely 2 lines long, the 2nd rather longer, 3-nerved; flowering glumes 3 lines long or rather more, faintly nerved, glabrous or pubescent, with a fine point or awn usually about 1 line long. Palea with a fine bifid point. Stamens 3.—Hook. f. Fl. Tasm. ii. 126; Reichb. Ic. Fl. Germ. t. 62.

**Victoria.** Barclay Ranges at an elevation of 3000 to 4000 ft., *F. Mueller*.

**Tasmania.** Formosa, *Gunn*; Swanport, *Story*.

One of the widely-dispersed forms of the *Sheep's Fescue* or *F. ovina*, Linn., very abundant on downs and hilly pastures of the temperate regions of both the New and the Old World.

Var. *aristata*. Spikelets rather larger with awns at least as long as the glumes.

**Victoria.** Ballarat, *Bacchus*.

**S. Australia.** Flinders and Barossa Ranges, *F. Mueller*.

\* 3. ***F. rigida***, *Mert. and Koch*; *Kunth, Enum.* i. 392.—A small rigid tufted annual, rarely above 4 or 5 in. high, with flat leaves, the ligula jagged. Panicle occupying more than half the plant, rigid and secund. Spikelets few, very shortly pedicellate on the very short branches, all turned to one side, 3 to 4 lines long, 6- to 10-flowered. Outer glumes narrow, keeled, acute; flowering ones rather above 1 line long, faintly 3-nerved, obtuse, unawned.—*Sclerochloa rigida*, Panz; Reichb. Ic. Fl. Germ. t. 58.

**S. Australia.** Introduced from Europe and now common about Adelaide and Hopkins River, *F. Mueller*; Lake Bonney, *Mrs. Wehl*; Port Lincoln, *S. F. Browne*.

SUBTRIBE V. HORDEINÆ.—Spikelets several- or 1-flowered, sessile in the alternate notches or on opposite sides of the rhachis of a simple spike, the rhachis of the spikelet usually produced beyond the upper flower into a short point or bearing an empty glume. Glumes entire, unawned or with a terminal untwisted awn.

## 99. AGROPYRUM, Beauv.

Spikelets several-flowered, more or less flattened, distichous and alternately sessile on the continuous or slightly notched rhachis of a simple spike, one face of the spikelet next the general rhachis, the rhachis of the spikelet more or less articulate under the flowering glumes. Glumes rounded on the back or scarcely keeled, tapering into points or awns, the flowering ones 3- to 7-nerved, the 2 outer empty ones usually shorter, narrower, 3- or rarely 1-nerved. Palea nearly as long as the glume, the 2 prominent nerves almost marginal, scabrous-ciliate. Ovary pubescent at the top. Styles short, distinct. Grain free or slightly adhering to the palea.

The genus is widely spread over the temperate regions of the globe. Of the three Australian species one is also in New Zealand, the two others appear to be







endemic. The genus is usually associated with *Triticum*, founded on the cultivated wheats, which are certainly nearly allied to *Agropyrum* but, as it appears to me, still nearer so to *Egyplos*. Nees referred *A. scabrum* to the section *Vulpia* of *Festuca*, misled probably by the aspect of slender specimens reduced to a single spikelet.

- |   |                           |
|---|---------------------------|
| Spikelets narrow, with long awns, erect and distant along the rhachis . . . . .   | 1. <i>A. scabrum</i> .    |
| Spikelets broad, with short points or awns, erect and close together along the rhachis . . . . .                            | 2. <i>A. velutinum</i> .  |
| Spikelets very flat, with short points or awns, spreading or at length reflexed and not distant along the rhachis . . . . . | 3. <i>A. pectinatum</i> . |

1. *A. scabrum*, Beauv. *Agrost.* 102. — Very variable as to stature, sometimes under 1 ft. high, slender with short filiform leaves, and from that to 3 or 4 ft. with narrow spreading flat or convolute leaves. Spike usually 6 in. to 1 ft. long, the rhachis scarcely notched. Spikelets distant, sessile, erect,  $\frac{1}{2}$  to 1 in. long without the awns, narrow, 6- to 20-flowered; in the small specimens sometimes only 1 or 2 spikelets. Glumes narrow, rigid, straw-coloured, mostly about 5-nerved, not distinctly keeled, the 2 outer empty ones rather shorter tapering into short points, the flowering ones 4 to 6 lines long without the awns, tapering into fine straight or at length spreading awns mostly longer than the glumes and sometimes above 1 in. long, those of the upper and of the lower glumes often not so long as the intermediate ones. Palea obtuse.—*Festuca scabra*, Labill. Pl. Nov. Holl. i. 22, t. 26; *Triticum scabrum*, R. Br. Prod. 178; Hook. f. Fl. Tasm. ii. 128; *Vulpia rectiseta* and *V. Browniana*, Nees in Pl. Preiss. ii. 107; *V. scabra* and *V. Brauniana*, Nees in Hook. Lond. Journ. ii. 419; *Festuca rectiseta*, *F. Browniana* and *F. Billardieri*, Steud. Syn. Glum. i. 304; *Anthosachne australasica*, Steud. l. c. 237.

**Queensland.** Moreton Bay, Leichhardt, C. Stuart; Warwick, Beckler; Suttor Desert, F. Mueller.

**N. S. Wales.** Port Jackson, R. Brown and others and thence to the Blue Mountains and far into the interior. Wells, A. Cunningham, Sieber, *Agrostotheca*, n. 95. and others; Lord Howe's Island, Fullagar.

**Victoria.** Wendu Vale, Robertson; Melbourne, Loddon, Forest Creek and many other localities, F. Mueller and others; Mount William, Sullivan.

**Tasmania.** Common, especially in dry and sandy places near the sea, J. D. Hooker and others.

**S. Australia.** Round St. Vincent's Gulf, F. Mueller, Behr and others.

**W. Australia.** King George's Sound and adjoining districts, Oldfield, Waleat, Drummond, n. 382, 383, 384.

Also in New Zealand.

A couple of specimens from Darebin Creek marked by F. Mueller var. *braviseta*, with very short awns and an irregular inflorescence, appear to have sterile very irregular spikelets and are probably hybrids.

2. *A. velutinum*, Nees in Hook. Lond. Journ. ii. 417.—Stems 6 in. to above 1 ft. high. Leaves chiefly at the base of the stem, flat or convolute when dry, not rigid, softly pubescent or nearly glabrous.

Spike raised on a long peduncle, 1 to 2 in. long, the rachis pubescent and notched. Spikelets almost erect, imbricate or the lower ones distant, ovate or oblong, about  $\frac{1}{2}$  in. long, usually 6- to 8-flowered. Glumes 3 to 5 lines long, rigid with short almost pungent points, the outer empty ones usually 3-nerved, the flowering ones broader and 5- or rarely 7-nerved. — *Triticum velutinum*, Hook. f. Fl. Tasm. ii. 129.

**Victoria.** Munyong mountains and Mount Hotham, *F. Mueller*.

**Tasmania.** Middlesex Plains and Surrey Hills, *Gunn*.

**3. *A. pectinatum*, Beauv. Agrost. 102.**—Stems from under 1 ft. to  $1\frac{1}{2}$  ft. high. Leaves chiefly at the base of the stem, narrow, flat, usually hairy. Spike raised on a long peduncle, 1 to 3 in. long, the rachis pubescent, not notched. Spikelets not very distant, spreading or at length reflexed, mostly about  $\frac{1}{2}$  in. long including the short points, 3- to 6-flowered. Glumes spreading, the 2 outer empty ones shorter, with only the midrib or 3-nerved; flowering glumes 4 to 5 lines long, rigid, 3- or 5-nerved, tapering into a rather long pungent point.—*Festuca pectinata*, Labill. Pl. Nov. Holl. i. 21, t. 25; *F. Muell.* Fragm. vi. 85; *Triticum pectinatum*, R. Br. Prod. 179; Hook. f. Fl. Tasm. ii. 129; *T. Brownei*, Kunth, Enum. i. 447; *Vulpia pectinata*, Nees in Hook. Lond. Journ. ii. 419.

**N. S. Wales.** Archer's Creek and Mount Royal, *Leichhardt*; Maneroo, *Herb. F. Mueller*.

**Victoria.** Snowy River, *F. Mueller*.

**Tasmania,** *Labillardière*; Hampshire Hills and Recherche Bay, *Gunn*; Southport, *C. Stuart*.

### \* 100. **LOLIUM**, Linn.

Spikelets several-flowered, singly sessile in the alternate notches on opposite sides of a simple spike, the edge of the spikelet (the backs of the glumes of one row) next the common rachis, the rachis of the spikelet glabrous. Glumes nearly similar, one outer one in the lateral spikelets empty and rather larger, or sometimes longer than the whole spikelet, in the terminal spikelet 2 outer ones empty.

A genus of very few species, natives of the temperate regions of the northern hemisphere, the two species introduced into Australia, found also, chiefly introduced, in other temperate or even tropical countries.

Outer glume shorter than the spikelet. Flowering glumes narrow, lanceolate, without any or with very short awns . . . . .

1. *L. perenne*.

Outer glume usually as long as or longer than the spikelet. Flowering glumes oblong, some or all usually with an awn as long as or longer than themselves . . . . .

2. *L. temulentum*.

\* 1. ***L. perenne*, Linn. ; Kunth, Enum. i. 436.**—An erect or slightly











decumbent glabrous grass of 1 to 2 ft., sometimes annual but usually lasting several years. Spike distichous, from a few inches to 1 ft. long. Spikelets at a considerable distance from each other on alternate sides of the rhachis. Outer glume of the lateral spikelets and 2 outer ones of the terminal one, empty, rigid, strongly nerved, longer than the others but much shorter than the spikelet. Flowering glumes 8 to 16 or even more, narrow, obtuse or acute, with the keel and 2 lateral nerves prominent, sometimes produced into a very short awn. In cultivation there are sometimes several outer empty glumes.—Reichb. Ic. Fl. Germ. t. 6; F. Muell. Fragm. viii. 127.

Now naturalised in several localities in **N. S. Wales, Victoria, Tasmania, and S. Australia**, *F. Mueller* and others.

\* **2. *L. temulentum*, Linn.; Kunth, Enum. i. 437.**—Usually taller than *L. perenne* and always annual. Outer glume of the lateral spikelets usually as long as or longer than the whole spikelet. Flowering glumes shorter and broader than in *L. perenne*, oblong, usually obtuse, with an awn as long as or longer than the glume itself. In some specimens however most of the glumes are awnless or very rarely the whole spikelet without awns.—Reichb. Ic. Fl. Germ. t. 5; F. Muell. Fragm. viii. 127.

Naturalised in **N. S. Wales, Victoria, Tasmania, and S. Australia**, and apparently more abundantly so than *L. perenne*, *F. Mueller* and many others.

Var. *unicola*, very slender with short few-flowered spikelets the outer glume scarcely so long as the spikelet, the awns usually rather long.—*L. unicola*, Sond. in Koch, Syn. Fl. Germ. ed. 2. 957.—Near Adelaide, *Blandowski*.

## 101. LEPTURUS, R. Br.

Spikelets 1-flowered or in a species not Australian 2-flowered, sessile and half embedded in the alternate notches of a more or less articulate simple spike. Outer empty glumes 2, one slightly overlapping the other on one side, or 1 only, appressed and covering the cavity, rigid and nerved. Flowering glume and palea shorter thin and hyaline, embedded in the cavity, the axis of the spikelet produced behind the palea into a minute point or bearing a small terminal empty glume. Styles short. Grain free from the glume.

A genus of few species, chiefly from the Mediterranean region, with one North American, two of the Mediterranean species extending to the sea-coasts of other parts of the Old World. Of the three Australian species two are common on the shores of the Mediterranean, the third has only been found out of Australia on the islands of the Pacific.

Annuals. Outer glumes with about 5 prominent nerves.

Axis of the spikelet produced into a minute point or bristle.

Outer glumes of the lateral spikelets 2 . . . . . 1, *L. incurvatus*.

- Outer glume of the lateral spikelets only 1 . . . . . 2. *L. cylindricus*.  
 Perennial. Outer glume of the lateral spikelets only 1,  
 several-nerved. Axis of the spikelet bearing a small  
 terminal empty glume . . . . . 3. *L. repens*.

1. ***L. incurvatus***, *Trin. ; Kunth, Enum. i. 462.*—A tufted or branching annual of 3 in. to 1 ft. or rarely more, slender in the Australian specimens with very narrow leaves. Spikes nearly cylindrical, slender, 2 to 6 in. long straight or curved. Outer glumes 2, rigid, acute, usually 5-nerved, about 3 lines long, placed in the lateral spikelets apparently side by side outside the rest of the spikelet, but one slightly overlapping the other at the base. Flowering glume and flower embedded in the cavity of the rhachis of the spike, the rhachis of the spikelet slightly produced behind the palea into a minute point, sometimes almost obsolete. In the terminal spikelet the 2 outer glumes are normally opposed to each other.—*Reichb. Ic. Fl. Germ. t. 2.*

**N. S. Wales.** Salt Marshes, Paramatta, *Woolfs*.  
**Victoria.** Port Phillip, *F. Mueller*.

Common in the Mediterranean region, found also in some parts of East India and in New Zealand.

2. ***L. cylindricus***, *Trin. Fund. Agrost. 123.*—Habit and foliage of *L. incurvatus*, in the Australian specimens usually shorter, more tufted, the leaves not quite so narrow and the spikes rather thicker and more frequently curved, but these differences are generally reversed in Mediterranean specimens. The terminal spikelet and the internal structure of the others the same in the two species, but the *L. cylindricus* has always only 1 rigid 5-nerved very pointed outer empty glume instead of the 2 of *L. incurvatus*.—*L. subulatus*, *Kunth, Enum. i. 462 ; Reichb. Ic. Fl. Germ. t. 3.*

**N. S. Wales.** Port Jackson (if *Monerma simplex*, *Gaudich. in Freyc. Voy. Bot. 412*, is correctly referred to this species.)

**Victoria,** Melbourne, *Adamson ; Brighton, Herb. F. Mueller*.

**W. Australia,** *Drummond*.

Common in the Mediterranean, found also in South Africa.

3. ***L. repens***, *R. Br. Prod. 207.*—A perennial creeping in the sands sometimes to a considerable extent, with divaricately branching stems. Leaves spreading, glaucous and glabrous or ciliate at the orifice of the sheaths. Spikes close upon the last leaf-sheath, 2 to 3 in. long, the articulate rhachis breaking much more readily than in the preceding species and therefore very rarely perfect in dried specimens. Spikelets usually about 4 lines long without the point. Outer glume closely appressed, almost embraced by the margins of the cavity, finely many-nerved, tapering into a short or long point, 2nd glume thin and hyaline, acute, concave, enclosing a palea nearly as long







and a hermaphrodite flower, the rhachis of the spikelet shortly continued at the back of the palea and bearing a small thin hyaline empty glume.—Brongn. in Duperr. Voy. Bot. 57, t. 16.

**N. Australia.** Arnheim N. Bay and Islands of the Gulf of Carpentaria, *R. Brown*; Port Darwin, *Schultz*, n. 227.

**Queensland.** Bird Islet, Wreck Reef, *Denham*; Raine Island. Cape York, *Challenger Expedition*.

Also in the islands of the South Pacific.

## 102. HORDEUM, Linn.

Spikelets 1-flowered, 3 together sessile or nearly so in the alternate notches of the rhachis of a dense cylindrical spike, the central flower (in the Australian species) hermaphrodite, those of the lateral spikelets usually male or neuter. Outer empty glumes 2, subulate or slightly flattened, tapering into straight awns or awnlike from the base. Flowering glume inserted rather higher up, convolute round the flower with a straight terminal awn. Palea 2-ribbed. Ovary crowned by a tuft of hairs. Stigmas nearly sessile.

A genus of few species, mostly of Mediterranean origin, dispersed over the temperate and subtropical regions of both hemispheres. The two Australian species are both probably introduced although one at least is now abundantly naturalised.

Outer empty glumes of the central spikelets more or less dilated and ciliate in the lower half . . . . .	1. <i>H. murinum</i> .
All the outer empty glumes subulate or awnlike from the base and not ciliate . . . . .	2. <i>H. nodosum</i> .

1. ***H. murinum*, Linn.; Kunth, Enum. i. 456.**—A coarse tufted or decumbent grass, varying from 6 in. to 2 ft. high. Leaves flat, the sheaths rather loose and glabrous, the lamina usually hairy. Spike dense and cylindrical, 2 to 4 in. long, thickly beset all round with the long erect rough awns. Spikelets 3 to 6 lines long without the awns, the outer empty awnlike glumes all at the base of the short rhachis forming a kind of involucre round the flowering ones, those of the central spikelet though very narrow and rigid, dilated and ciliate in the lower half, and the lowest awn of the lateral spikelets usually very slightly dilated and shortly ciliate, the 2nd subulate and scabrous only. Flowering glume usually glabrous outside, more or less ciliate inside, the ribs of the palea also ciliate. Awns varying from  $\frac{1}{2}$  to 1 in. long.—Reichb. Ic. Fl. Germ. t. 11; F. Muell. Fragm. viii. 126.

Introduced and now well established in waste places in **N. S. Wales, Victoria, Tasmania, S. Australia** and **W. Australia**. *Woolfs, F. Mueller, Oldfield* and others.

\* 2. ***H. nodosum*, Linn. Spec. Pl. 126.**—A taller and less coarse

grass than *H. murinum*. Spike on a long peduncle dense and cylindrical but not so thick as in that species, 1 to 2 in. long. Outer empty glumes all very narrow, subulate or awnlike from the base and slightly scabrous not ciliate. Flowering glume and palea glabrous. Awns shorter than in *H. murinum*.—*H. pratense*, Huds.; Reichb. Ic. Fl. Germ. t. 11; *H. secalinum*, Schreb.; Trin. Spec. Gram. t. 3; F. Muell. Fragm. viii. 126.

Only known from Australia in very few specimens from **N. S. Wales** **Tasmania**, but said to be there established.

### CLASS III. ACOTYLEDONES OR CRYPTOGRAMS.

No real flowers, that is, neither stamens nor pistils nor true seeds, the reproduction carried on by means of minute often highly microscopic granules called *spores*.

The only orders here included are the higher VASCULAR CRYPTOGRAMS, or FERNS and their allies, which have true stems enclosing bundles of vascular tissue, and the spores enclosed in capsule-like cases called *spore-cases* or *sporangia*. The lower Orders: Mosses, Fungi, Lichens, Algae and their respective allies, can now scarcely be determined or studied without the aid of special works devoted to them, to condense which for the Australian Flora would be too formidable a task for me to undertake at my age. Neither is the history here entered into of the very various processes by which the spores are developed in the Orders described, or of the intermediate stages of their plant life from the spore to the perfect plant; this inquiry belongs to the domain of Vegetable Physiology, and requires the study of living individuals with the aid of works specially devoted to the subject. In Cryptogams, as in Flowering Plants, their life history can be investigated neither in field excursions nor from dried specimens, and therefore does not come into the special scope of local Floras.

### ORDER. CXLV. LYCOPODIACEÆ.

Stem or rhizome bearing true leaves, either linear, or small and 1-nerved, or reduced to minute scales. Spore-cases solitary or few together, sessile in the axils of the leaves or of the bracts of a terminal spike, either all similar or of two kinds, larger ones *macrosporangia* containing a few larger spores or *macrospores*, and smaller *microsporangia*, containing numerous smaller often microscopic *microspores*, the differences now generally admitted to be sexual.

The order is spread over nearly the whole globe, and three of the Australian genera have nearly as wide a range, two others are both in the New and the Old World, chiefly tropical or southern, the remaining two extend to New Zealand, one of them being also in the Pacific Islands.

Leaves linear, on a rhizome often submerged. Spore-cases  
of 2 kinds, solitary in the axils or half-enclosed in the  
dilated bases of the leaves . . . . . 1. ISOETES.















- Minute plant with radical linear leaves surrounding a leafless peduncle. Spore-cases all similar, solitary within the bracts of a terminal spike . . . . . 2. *PHYLLOGLOSSUM*.
- Stems branching, with small leaves usually crowded in 4 rows. Spore-cases solitary within the bracts of terminal spikes or the upper leaves of the stem.
- Spore-cases and spores all similar . . . . . 3. *LYCOPIDIUM*.
- Spore-cases and spores of two kinds. Plants usually weaker or smaller than in *Lycopodium* . . . . . 4. *SELAGINELLA*.
- Small floating plant with small crowded leaves. Spore-cases of 2 kinds in the axils of some of the stem-leaves . . . . . 5. *AZOLLA*.
- Stems leafy or with distant scales. Spore-cases 2 or 3 together, united into a 2- or 3-celled capsule or sorus, sessile at the base of bifid bracts or scales.
- Stems simple, leafy. Sori usually 2-celled . . . . . 6. *TMESITERTIS*.
- Stems dichotomous, with minute distant scales. Sori usually 3-celled. . . . . 7. *PSILOTON*.

### 1. ISOETES, Linn.

Aquatic plants entirely submerged or rarely terrestrial in swampy or wet sandy places. Leaves linear and thick or subulate, crowded on a short thick rhizome, dilated and concave at the base, the margins of the cavity often more or less folded over the spore-cases. Spore-cases sessile at the base of the leaves, solitary, membranous, of two kinds, those of the outer leaves filled with spherical macrospores, marked with a transverse raised line, and above it 3 radiating raised lines, those of the inner leaves filled with minute powdery microspores.

A small genus having nearly the general range of the order except in hot or dry climates. It has been very carefully studied especially by Durieu and Alex. Braun, who have however multiplied the species far beyond what could be adopted on the principles laid down for the present work. They consider the Australian ones as all endemic, whilst others believe them to be all reducible to the generally spread *I. lacustris*. I have unfortunately not had the advantage of examining F. Mueller's own collections, as the parcel containing them together with the Marsileaceæ were accidentally omitted to be sent to me.

- Submerged plant with rather thick leaves from 2 to above 6 in. . . . . 1. *I. lacustris*.
- Terrestrial or swampy plant with filiform leaves of 1 to 3 in. . . . . 2. *I. Drummondii*.

I have not seen *I. Muelleri*, A. Br. in Berl. Monatsber. 1868, 541, from Rockhampton, O'Shanesy, and am unable to form any opinion as to how far it differs from either of the above.

1. *I. lacustris*, Linn.; Hook. Brit. Ferns. t. 55.—A perennial of a bright green, forming dense tufts under the water. Leaves rather thick, linear, usually 2 to 3 in. long in calm lakes and ponds, more rarely above 6 in. in running water, their enlarged bases giving the plant a slightly bulbous aspect, the old leaves usually decaying entirely without leaving the scale-like remains characteristic of

some European species. Macrospores minutely granular-tuberculate.

**Tasmania.** Alpine Lakes, *Gunn*; South Esk River, *C. Stuart*.

I am quite unable to distinguish this from the species which generally inhabits Alpine lakes in the northern hemisphere, and should include in it *I. humilior*, and *I. elatior*, *F. Muell.*; *A. Br.* in *Linnaea*, xxv. 722; *I. tasmanica*, *F. Muell.*; *Durieu* in *Bull. Soc. Bot. Fr.* xi, 104; *I. Gunnii*, *I. elatior*, *I. Hookeri*, *I. Stuartii*, *A. Br.* in *Berl. Monatsber.* 1868, 535 to 539, of all of which I have seen specimens which I believe to be authentic. One character insisted upon, that of the degree in which the margins of the cavity of the leaf cover the spore-case, seems to me to depend much on the degree of development of the fructification.

**2. *I. Drummondii***, *A. Br.* in *Berl. Monatsber.* 1863, 593, 1868, 542.—A much smaller plant than *I. lacustris*, with very slender or filiform leaves 1 to 3 in. long, their dilated bases short and very broad, appearing whitish when dry, giving a very bulbous aspect to the plant. These differences and the more general presence of stomata may however be due to the more terrestrial station of the plant. The macrospores appear to me to be very similar to those of *I. lacustris*.—*I. tripus*, *A. Br.* l. c. 1863, 559, 1868, 544; *I. phæospora*, *Dur.* in *Bull. Soc. Bot. Fr.* xi, 103.

**W. Australia**, *Drummond* n. 989, 990.

## 2. PHYLLOGLOSSUM, Kunze.

Small stemless plant, with a tuberous rootstock and radical leaves and peduncles. Spore-cases reniform, 2-celled, 2-valved, sessile in the axil of the bracts of a pedunculate spike, filled with minute powdery spores.

The genus is limited to the single Australian species which is also in New Zealand.

**1. *P. Drummondii***, *Kunze* in *Bot. Zeit.* 1843, 721.—Rootstock small, with a few fibrous roots, producing an ovoid tuber annually renewed as in *Orchis*, so that at the time of fruiting there are generally two present. Leaves few, linear,  $\frac{1}{4}$  to  $\frac{1}{2}$  in. long, in a radical tuft. Peduncle usually about twice as long, bearing an erect cylindrical spike of 2 to 3 lines. Bracts broad, with an erect point, shortly exceeding the spore-cases.—*Hook.* Ic. Pl. t. 908; *Hook.* f. Fl. Tasm. ii. 154; *Metten.* in *Bot. Zeit.* 1867, 97, with a fig.; *Lycopodium sanguisorba*, *Spring*, *Monogr. Lycopod.* ii. 36.

**Victoria.** Damp places. Melbourne, *Adams*; Portland, *Allott*; near Dandenong and Malacotta Inlet, Gipps' Land, *F. Mueller*.

**Tasmania.** George Town, *Gunn*.

**W. Australia**, *Drummond*, n. 993; West End of Stirling Range, *F. Mueller*.











### 3. LYCOPODIUM, Linn.

Stems leafy, hard, branching, creeping prostrate or erect. Leaves small, entire or minutely serrate, inserted all round the stem, usually in 4 rows. Spore-cases all of one kind, flattened, 1-celled, 2-valved, sessile in the axils of the upper leaves, or of bracts usually smaller or broader than the stem-leaves and forming terminal or lateral spikes. Spores all minute and powdery.

The genus is widely spread over every part of the globe. Of the eleven Australian species, three are generally distributed in the New and the Old World, one limited to the Old World, the seven others are in New Zealand, five of them extending to the Pacific Islands and two to South America.

- Leaves lanceolate, cartilaginous, crowded all round the stem, mostly 3 to 6 lines long.
- Stems short, erect. Spore-cases in the axils of the upper leaves . . . . . 1. *L. selago*.
- Stems elongated, ascending. Spikes terminal, usually several. Bracts smaller than the stem-leaves but much longer than the spore-cases . . . . . 2. *L. varium*.
- Stems elongated, pendulous. Spikes terminal, several. Bracts scarcely exceeding the spore-cases . . . . . 3. *L. phlegmaria*.
- Leaves usually narrow, crowded round the stem, under 3 lines long. Spore-cases in spikes, with small broad bracts.
- Spikes pedunculate.
- Stems extensively creeping with numerous ascending leafy branches. Spikes terminal . . . . . 4. *L. clavatum*.
- Stems creeping, short or scarcely branched. Spikes single on lateral erect peduncles bearing small leaves . . . . . 5. *L. carolinianum*.
- Spikes sessile, lateral.
- Stems branched at the base, elongated and slender. Leaves subulate . . . . . 6. *L. laterale*.
- Stems diffuse, and much branched. Leaves linear . . . . . 7. *L. diffusum*.
- Spikes sessile, terminal, usually short. Stems often above 2 ft. long.
- Branches numerous, spreading or flexuose. Spikes nodding . . . . . 8. *L. cernuum*.
- Stems and branches erect, dense. Spikes erect . . . . . 9. *L. densum*.

(See also the first two species of SELAGINELLA.)

- Leaves distichous and decumbent in 2 opposite rows, with smaller adnate ones resembling stipules. Spikes sessile, terminal or paniculate.
- Distichous leaves broadly lanceolate. Bracts with spreading tips . . . . . 10. *L. scariosum*.
- Distichous leaves narrow-lanceolate. Bracts with appressed tips scarcely exceeding the spore-cases . . . . . 11. *L. volubile*.

(Most species of SELAGINELLA have the foliage of the last two species, but are more delicate and diffuse besides the difference in the spore-cases.)

1. ***L. selago***, *Linn.* ; *Spring, Monogr. Lycop.* i. 19, ii. 5. —Stems scarcely creeping, though slightly decumbent and rooting at the base, the forked erect branches forming dense level-topped tufts 3 to 6 in. high, completely covered with their crowded but spreading dark-green leaves, all lanceolate, 3 to 4 lines long, with a short fine point. Spore-cases in the axils of the upper leaves, not forming a distinct spike, the leaves or bracts being quite similar to the stem-leaves.—Hook. f. Fl. Tasm. ii. 155. t. 170; Hook. Brit. Ferns, t. 84.

**Victoria.** Mount Baw-Bawat an elevation of 4000 ft. and Mynyong Mountain, up to 6000 or 7000 ft. *F. Mueller*.

**Tasmania.** Mount Wellington, *J. D. Hooker, Gulliver*; Mount Field East. *F. Mueller*.

In most cool mountainous alpine or arctic regions both of the northern and southern hemispheres. The Australian specimens form generally rather longer and looser tufts than the European ones, with some approach to some states of *L. arvense*, a tendency not observed in northern specimens.

2. ***L. varium***, *R. Br. Prod.* 165.—A variable species, some of the smaller more compact specimens approaching *L. selago*, but usually decumbent or elongated and rooting at the base, with ascending branches of 6 in. to 1 ft. Leaves crowded all round the stem, lanceolate, obtuse, spreading or rarely erect, 3 or 4 lines or sometimes nearly  $\frac{1}{2}$  in. long. Spikes terminal, 1 to 4 in. long, solitary or 2 or 3 together, continuous with the leafy branch with bracts sometimes leafy 2 to 3 lines long, in other specimens short broad obtuse, imbricate in 4 rows, and 1 to 2 lines long, almost as in *L. phlegmaria*, or small and acuminate approaching those of the New Zealand *L. Billardieri*, *Spring*, and thus almost connecting these species.—*Spring, Monogr. Lycopod.* i. 57, ii. 24; Hook. and Grev. Ic. Filic. t. 112; Hook. f. Fl. Tasm. ii. 155, t. 170; *L. selago*, *var.* *F. Muell. Fragm.* v. 111.

**N. S. Wales.** Lord Howe's Island, *C. Moore*.

**Victoria.** Genoa Peak and Mynyong Mountains, *F. Mueller*.

**Tasmania.** Table Mountain (Mount Wellington), *R. Brown*; abundant on the ground and trunks of trees, *J. D. Hooker*.

Also in New Zealand, the Pacific Islands and South Africa.

3. ***L. phlegmaria***, *Linn.* ; *Spring, Monogr. Lycop.* i. 63, ii. 28.—Stems elongated, usually pendulous from rocks or trunks of trees. Leaves crowded, cartilaginous, spreading, mostly lanceolate and 3 to 6 lines long, but occasionally oblong and obtuse. Spikes slender at the ends of the branches, usually several and often forked, 2 to 3 or even to 6 in. long. Bracts imbricate in 4 rows, usually broad and scarcely exceeding the spore-cases, but in some specimens with a lanceolate point twice as long.

**Queensland.** Rockingham Bay, *Dallachy*; Daintree River, *Fitzalan*.

Widely spread over tropical Africa and Asia.

1. *L. clavatum*, Linn.; *var. fastigiatum*.—Stems from a long creeping leafless base or rhizome, procumbent, leafy, ascending to a few inches, or rarely above 6 in. in the Australian specimens. Leaves crowded, linear or linear-lanceolate, rarely above 2 lines long, acute but without the hairlike point of the common European form. Spikes terminal, erect, more or less pedunculate,  $\frac{1}{2}$  to 2 in. long. Bracts closely imbricate, lanceolate, acuminate, with fine usually spreading tips.—*L. fastigiatum*, R. Br. Prod. 165; *L. diffusum*, Spring, Monogr. Lycop. ii. 39, not of R. Br.; *L. clavatum*, *var. magellanicum*, Hook. f. Fl. Tasm. ii. 157.

**Victoria.** Snowy River, Maroka Valley, Mount Useful, *F. Mueller*.

**Tasmania.** Derwent River, *R. Brown*; moist boggy subalpine places abundant, *J. D. Hooker*; Mount Wellington and Mount Field East, *F. Mueller*.

5. *L. carolinianum*, Linn.; *Spring, Monogr. Lycop. i. 98, ii. 46*.—Stems leafy but creeping and rooting like rhizomes, with very short or scarcely any ascending barren branches. Leaves crowded, narrow lanceolate, acuminate, not above 2 lines long in the Australian specimens, two rows often rather longer and more spreading than the other two. Fertile branches (often called peduncles) erect, 1 to 6 in. high including the spike, with small loosely erect leaves, the spike or fruiting part terminal or sometimes below the end. Bracts small, subulate-acuminate and spreading from a broad base, often but not always minutely serrulate-ciliate.—Hook. f. Fl. Tasm. ii. 170; *F. Muell. Fragm. v. 111*.

**Queensland.** Moreton Island, *F. Mueller*.

**Tasmania.** Boggy places, not uncommon, *J. D. Hooker*.

**W. Australia.** *Drammond, n. 351*; Albany, *Preiss, n. 1831*. These specimens are very small with short branching creeping stems, the fruiting branches 1-2 in. long, and are distinguished as *L. carolinianum*, Kunze, in Pl. Preiss. ii. 108, or as *L. Drammondii*, Spring, Monogr. ii. 35, as having the stem-leaves all similar instead of the lateral rows being longer and more spreading, but the character is variable in the typical North American specimens.

The species extends over North and South America, tropical and southern Africa, Ceylon and New Zealand.

6. *L. laterale*, R. Br. Prod. 165.—Stems leafy from the base, prostrate decumbent or ascending, slightly branched, from a few inches to 2 feet long. Leaves crowded all round, lanceolate-subulate, 2 to 3 lines long. Spikes few, lateral and sessile, mostly about  $\frac{1}{2}$  in. long. Bracts small, from a very broad base shortly acuminate, usually brown-coloured.—Spring, Monogr. Lycop. i. 82, ii. 38; Labill. Serot. Austr. Caled. t. 15; Sieb. Syn. Filic. n. 84.

**Queensland.** Rockingham Bay, *Dallachy*; Moreton Island, *F. Mueller*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *A. Cunningham*, *Woolfs*.

**Victoria.** Near Brighton, Bunip Creek, Mount Abrupt, *F. Mueller*; Gramphians, *Wilhelmi, Sullivan*.

Also in New Caledonia and New Zealand.

7. *L. diffusum*, R. Br. Prod. 165.—Very near *L. laterale* to  
2 x 2



which Hook. f. Fl. Tasm. ii. 156, refers it as a variety, but a much smaller, more rigid plant, the procumbent stems more branched and very shortly ascending. Leaves linear, acute or almost obtuse, rarely above 2 lines long, spreading or almost imbricate. Spikes of *L. laterale*, usually brown, lateral, sessile or scarcely pedunculate.

**Victoria.** Grampians, Dalton.

**Tasmania.** Port de Lesperance, R. Brown; Alpine Bogs, Lake St. Clair, etc. Gunn; Macquarrie Harbour, Milligan; near Circular Head, F. Mueller.

8. ***L. cernuum***, Linn.; Spring, Monogr. Lycop. i. 79, ii. 37.—Stems hard, rising to 2 ft. or when very luxuriant to 5 or 6 ft. in height, with numerous spreading flexuose repeatedly forked branches. Leaves spreading all round the stem, fine, subulate, incurved, 1 to 2 lines long. Spikes sessile above the last leaves, nodding, 2 to 3 lines long. Bracts ovate-lanceolate, ciliate, imbricate in 8 rows, longer than the spore-cases.

**N. Australia.** Upper Victoria River, F. Mueller.

**Queensland.** Rockingham Bay, Dallachy; Daintree River, Fitzalan; Bowen, Woolls.

Common throughout the tropics in the New as well as the Old World.

9. ***L. densum***, Labill. Pl. Nov. Holl. ii. 104, t. 251.—Stems from a short creeping base, erect, rigid, usually 1 to 1½ but sometimes 2 to 4 ft. high, very densely branched in the upper part. Leaves crowded all round, those of the main stem lanceolate with scarious tips and often 2 lines long, those of the branches imbricate and scarcely 1 line long. Spikes numerous, terminal, erect and sessile, from under ½ in. to 1 in. long. Bracts ovate-lanceolate, with spreading tips often scarious on the margins.—R. Br. Prod. 165; Spring, Monogr. Lycop. i. 86, ii. 40; Hook. f. Fl. Tasm. ii. 156; F. Muell. v. 111; Sieb. Syn. Filic. n. 82.

**N. S. Wales.** Port Jackson, R. Brown, A. Cunningham, Fraser; New England, C. Stuart.

**Victoria.** Grampians, Sullivan; Mount Cobberas, Imlay; Upper Yarra River, F. Mueller; Cape Howe, Walter.

**Tasmania.** Labillardière; Derwent River and Port Dalrymple, R. Brown; abundant in heathy places throughout the island, J. D. Hooker.

Also in New Zealand and Norfolk Island.

10. ***L. scariosum***, Forst.; Spring, Monogr. Lycop. i. 108, ii. 49.—Stems prostrate or creeping sometimes to a great length, with numerous shortly ascending branches. Leaves distichously spreading, oblong or lanceolate, acute, decurrent, about 2 lines long, with small appressed stipule-like ones between the two rows. Spikes sessile, usually terminal, about ½ in. long. Bracts in 4 rows, broad, with spreading tips scarious on the margin.—Hook. Ic. Pl. t. 966; Hook. f. Fl. Tasm. ii. 157; *L. decurrens*, R. Br. Prod. 165.

**Victoria.** Mount Baw-Baw, and sources of the Yarra, F. Mueller.







**Tasmania.** Table Mountain (Mount Wellington), *R. Brown, Glean*; common on the mountains in boggy places, *J. D. Hooker*.  
Also in New Zealand and in Antarctic America.

11. **L. volubile**, *Forst.*; *Spring, Monogr. Lycop.* i. 105, ii. 49.—Stems slender, wiry, flexuose, climbing to a great extent, with few narrow appressed leaves, but emitting numerous leafy branches, with two rows of distichously spreading leaves as in *L. scariosum*, but much narrower, falcate, decurrent, smooth and shining, with mucronate tips, the small appressed leaves as in *L. scariosum*. Spikes when present numerous, sessile at the ends of the branches,  $\frac{1}{2}$  to  $1\frac{1}{2}$  in. long, slender. Bracts broad, closely imbricate, shortly acuminate but without spreading tips.—*Hook. and Grev. Ic. Filic. t. 170.*

**N. Australia.** Glenelg River, *Martin*. A single specimen without fructification, but evidently belonging to this species, which is in Java as well as in New Zealand and the Sandwich Islands. *Spring* gives also the station King George's Sound, *Quoy in herb. Webb*, but this is probably a mistake.

4. SELAGINELLA, *Spring.*

Stems leafy, usually much branched, more slender or smaller than in *Lycopodium*. Leaves small, entire or minutely serrate, inserted all round the stem but in four rows. Spore-cases of two kinds, small ones filled with minute, powdery spores called *microspores*, and larger containing 1 to 6 larger spores called *macrospores*, all opening in 2 to 4 valves and sessile in the axils of bracts in terminal spikes.

The genus has the same wide range as *Lycopodium*. Of the five Australian species three extend into tropical Asia, or at least into the Malayan Archipelago, and one of them is also in America, two others appear to be endemic, but the species have in many instances been so multiplied by monographers that the exact limits of the really distinct ones cannot be given without a careful revision of the whole genus. The generic character, the presence of two kinds of spores, is probably constant, but requires a close observation to verify it. The habit however generally suffices to distinguish it from *Lycopodium*, although the first two of our species have the foliage of *Lycopodium* (but smaller) and the last two of *Lycopodium* have that of *Selaginella*.

- Small erect plants. Stem-leaves all similar. Spikes slender, the bracts imbricate in 4 rows.
- Stems from a branching base, simple, about 1 in. long . . . 1. *S. Preissiana*.
- Stems branching upwards, 2 to 6 in. or sometimes more . . . 2. *S. uliginosa*.
- Stem-leaves in two outer rows distichous and spreading, 2 inner rows closely appressed. Spikes slender, the bracts imbricate in 4 rows.
- Stems bare at the base, ascending or erect, very much branched upwards to a length and breadth of 6 to 10 in. (in outline) . . . 3. *S. flabellatum*.
- Stems diffuse or creeping and much branched . . . 4. *S. concinna*.
- Stem-leaves and habit of *S. concinna* or much smaller. Spike oblong, the bracts spreading, nearly resembling the stem-leaves . . . 5. *S. Belangeri*.

1. **S. Preissiana**, *Spring, Monogr. Lycop.* ii. 61.—An erect slender annual of 1 to 2 in., divided at the base into simple or once forked

branches leafy throughout. Leaves all similar, spreading, very narrow, acuminate,  $\frac{1}{2}$  to  $\frac{3}{4}$  line long. Spikes occupying usually the greater part of the plant. Bracts the length of the stem-leaves, acute or acuminate, imbricate in 4 rows.—F. Muell. Fragm. v. 112; *Lycopodium gracilimum*, Kunze in Pl. Preiss. ii. 109.

**Victoria.** Fitzroy River, *Robertson*; Grampians, *Salliman*; Dandenong Ranges and mountains of Snowy River, Gipps' Land, *F. Mueller*; Ararat, *Green*.

**Tasmania.** South Esk River, *C. Stuart*.

**W. Australia.** Swan River, *Drummond*, *Preiss.*, v. 1882; Blackwood River, *Oldfield*.

2. ***S. uliginosa***, *Spring*, *Monogr. Lycop.* ii. 60.—Stems from a creeping base erect or ascending, slender but rigid, branching and leafy throughout, usually 2 to 6 in. long but occasionally much drawn up. Leaves all similar or nearly so, ovate-lanceolate, acute, keeled, spreading or at length reflexed, sometimes oblique but not vertical. Spikes terminal, slender, from 3 or 4 lines to 1 in. long. Bracts smaller narrower and more acute than the stem-leaves, imbricate in 4 rows, the points appressed or slightly spreading.—Hook. f. Fl. Tasm. ii. 158; F. Muell. Fragm. v. 112; *Lycopodium uliginosum*, Labill. Pl. Nov. Holl. ii. 104, t. 251; R. Br. Prod. 165; Sieb. Syn. Filic. n. 83.

**Queensland.** Stradbroke Island, *W. Hill*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *A. Cunningham*, *J. D. Hooker* and others; New England, *C. Stuart*; Clarence River, *Wicks*; Macleay River, *Hervey*; Richmond River, *Mrs. Hodgkinson*; Lord Howe's Island, *C. Moore*.

**Victoria.** Port Phillip, *R. Brown*, *Adams*, *F. Mueller*; Portland, *Allitt*; Grampians, *Salliman*; Dandenong Ranges and Gipps' Land, *F. Mueller*; Cape Howe, *Walter*.

**Tasmania.** *Green*; probably common in marshy places, *J. D. Hooker*; Pass's Straits, *Milne*.

3. ***S. flabellata***, *Spring*, *Monogr. Lycop.* ii. 174.—Rhizome creeping and rooting to a great extent, emitting erect leafy stems, simple for 2 to 4 in., then expanding into a broadly ovate form, 6 to 10 in. long and sometimes nearly as wide, densely branched. Leaves in 4 rows, the 2 outer rows distichously spreading, nearly vertical, falcate, 1 to  $1\frac{1}{2}$  lines long, usually dark green on the upper side, pale and shining underneath in the dried state, inner rows not half so long, semicordate, fine pointed, converging over the rhachis. Spikes 3 to 9 lines long, slender. Bracts keeled, fine-pointed, imbricate in 4 rows.—*Lycopodium flabellatum*, Linn.

**Queensland.** Rockingham Bay, *Dallachy*; Daintree River, *Fitzalan*.

Also in the Malayan Archipelago to South China and in tropical America. The species probably includes *S. argentea*, *Spring*, and some others.

4. ***S. concinna***, *Spring*, *Monogr. Lycop.* ii. 199.—Stems slender, creeping, pinnately branched and leafy throughout, the numerous intricate branches shortly ascending. Larger leaves in two rows, distichously spreading, oblong, obtuse or acute, 1 to  $1\frac{1}{2}$  lines long







scarcely cordate at the base; inner rows smaller, ovate, appressed. Spikes terminal, 4 to 8 lines long, about 1 line diameter. Bracts keeled, acuminate, imbricate in 4 rows, the tips usually spreading.—*Lycopodium concinnum*, Swartz.

**Queensland.** Rockingham Bay, *Dallachy*; Daintree River, *Fitzalan*; York Peninsula, *N. Taylor*.

Also in East India and the Mascarene Islands.

5. **S. Belangeri**, *Spring*, *Monogr. Lycop.* ii. 212. —Stems creeping, pinnately branched, leafy throughout as in *L. concinna*, but a smaller more delicate plant rarely 6 in. and often under 1 m. long. Larger leaves in 2 rows, distichously spreading, scarcely 1 line long, ovate; 2 inner rows appressed, rather smaller. Spikes terminal, oblong, rarely above 6 lines long, 2 lines broad in the larger specimens, the spreading bracts very similar to the larger stem-leaves.—*Lycopodium Belangeri*, Bory in *Belang. Voy. Bot.* 12, t. 1, f. 2.

**N. Australia.** Port Darwin, *Schultz*, n. 111. 315; Etheridge River, *Gulliver*.

**Queensland.** Rockingham Bay, *Dallachy*; York Peninsula, *N. Taylor*.

*Lycopodium nanum*, R. Br. *Prod.* 166 *Selaginella nanula*, *Spring*, *Monogr. Lycop.* ii. 211, is founded upon 2 minute specimens which had been mixed with some other dwarf plants in Banks and Solander's Endeavour River collection, they are both quite simple with a single fibre to the root, one  $\frac{1}{4}$  in. high, the other very little longer though in fruit. They appear to be small starved specimens fruiting the first year, perhaps of *S. Belangeri*, although the bracts are much smaller than in that species more like those of the Ceylonese *L. ciliare*, Retz, but some of Schultz's specimens of *S. Belangeri* have the bracts as small on the side branches. R. Brown also in Herb. Banks refers to *S. nanula* some nearly allied dwarf specimens from South Africa.

## 5. AZOLLA, Linn.

Small floating plants, with branching and rooting leafy stems. Leaves small, imbricate, unequally 2-lobed. Spore-cases in pairs, sessile in the axils of the leaves on the main branches, one a globular membranous sac enclosing a cluster of small globular pedicellate spores (or sporangia), the other smaller, ovoid, containing a single macrospore surrounded at the base by 2, 1 or more corpuseles, called by some antheroids, by others abortive spores.

A genus of few species, dispersed over the tropical, the northern subtropical and southern cooler regions of the globe. Of the two Australian species one is also Asiatic and African, the other extends only to New Zealand. The affinities of the genus have been variously given according to the interpretation of the parts of fructification. It is certainly not closely allied to any one, but appears to me to be much nearer to *Selaginella* than to Marsippos. I have not had F. Mueller's specimens of this genus.

Branches of the stem linear and regularly pinnate . . . . . 1. *A. pinnata*.  
Branches of the stem with the leaves shortly obovate . . . . . 2. *A. rubra*.

1. **A. pinnata**, R. Br. in *Flind. Voy.* ii. 611, t. 10, *Prod.* 167.—Stems ones or twice pinnate, broadly ovate in outline, with linear leafy

branches, each plant under 1 in. long but generally collected in large masses on the surface of the water, emitting numerous rootlets, at first entire and sometimes dilated and flat, the older ones elegantly feathery. Leaves ovate, obtuse, concave, regularly but loosely imbricate, the upper lobe of each leaf about  $\frac{1}{2}$  line long, the lower lobe smaller. Larger spore-cases when full grown globular, reddish, nearly 1 line diameter, the smaller ones oblong, about  $\frac{1}{3}$  line long, with usually 4 corpuscles at the base of the macrospore.—Griff. in *Calcutta Journ. Nat. Hist.* v. 257, t. 15 to 17; Metten. in *Linnaea*, xx. 273, t. 3.

**N. S. Wales**, *Fraser*; Paterson's and Richmond Rivers, *R. Brown*.

**Victoria**. Goulburn River, *F. Mueller*.

Dispersed over tropical Asia and Africa.

2. **A. rubra**, *R. Br. Prod.* 167.—Individual plants smaller more compact and broader than in *A. pinnata*, the branches short, with fewer closely imbricate but spreading leaves, the roots all simple in Brown's as well as our own specimens. Larger spore-cases globular, about  $\frac{1}{2}$  line diameter, the smaller oblong ones scarcely  $\frac{1}{4}$  line, the structure otherwise the same as in *A. pinnata*.—Hook. f. *Fl. Tasm.* ii. 158.

**Queensland**. Brisbane River, *F. Mueller*.

**N. S. Wales**. Paterson's River, *R. Brown*.

**Victoria**. Wendu River, *Robertson*; Melbourne, *Adamson*; Avon River, *F. Mueller*.

**Tasmania**. Floating on marshes and ponds, *Gunn*.

**S. Australia**. Murray River, *Behr*.

Also in New Zealand.

## 6. TMESIPTERIS, Bernh.

Stems simple, leafy. Leaves vertical, sessile and decurrent, entire, intermixed with leafy bracts bipartite on a short petiole. Spore-cases usually two together, united into a capsule-like sorus, sessile on the petiole of the bracts, transversely oblong, flattened, 2-celled and didymous or 2-lobed, opening loculicidally in 2 valves. Spores minute, uniform.

The genus is limited to a single species found also in New Zealand and the Pacific Islands.

1. **T. tannensis**, *Bernh. in Schrad. Journ.* 1800, ii. 131, t. 2, f. 5.—Stems from a creeping slender rootstock ascending or pendulous, 6 in. to 1 ft. long. Leaves obliquely oblong or narrow lanceolate, usually about  $\frac{1}{2}$  in. long but sometimes nearly 1 in., truncate obtuse or acute at the end, the lower margin shortly decurrent, the single central nerve often produced at the end into a fine point. Bracts rather shorter than the leaves and occasionally replacing them in the upper part of the stem, deeply divided into 2 segments like the leaves











but smaller and more acute. Capsule-like sori about 2 lines broad and 1 line long, much compressed, parallel to the petiole.—Labill. Pl. Nov. Holl. ii. 105, t. 252; F. Muell. Fragm. v. 112; *Lycopodium tannense*, Spreng. in Schrad. Journ. 1799, ii. 267; *Psilotum truncatum*, R. Br. Prod. 161; *Psilotum Forsteri*, Endl. Iconogr. t. 85; *Tmesipteris truncata*, Desv. in Ann. Soc. Linn. Par. vi. 192; Hook. Gen. Filic. t. 86; *T. Forsteri*, Endl. Prod. Fl. Norf. 6; Spring, Monogr. Lycop. 265; Hook. f. Fl. Tasm. ii. 155; *T. Ballardieri*, Endl. l. c. 6; Spring, l.c. 266.

**Queensland.** Bellender Ker Range and Mount Lindsay, *W. Hill*; Rockingham Bay, *Dallachy*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *A. Cunningham* and others; New England, *C. Stuart*; Clarence River, *Wilcox*; Illawarra, *Johnson*; Lord Howe's Island, *C. Moore*.

**Victoria.** Yarra and Dandenong Ranges, Sealer's Cove, Gipps' Land, *F. Mueller*.

**Tasmania.** Derwent River, *R. Brown*; Not uncommon hanging from rocks and trunks of trees, *J. D. Hooker*, also on moist banks, *A. Cunningham*.

Sprengel's specific name *tannensis* has been discarded by some botanists because Forster's specimens in the British Museum are marked as from New Zealand and not from Tanna, and are probably those designated in Forster's Prodrum as *Osmunda obtusa*, Soland., from New Zealand, but there is every reason to believe that the plant grows in Tanna as it does in several other islands of the Pacific, and Sprengel positively states that Forster's specimen in his herbarium was from that island. The Californian station given on the authority of two specimens in Herb. Hook. from Douglas, has probably arisen from some accident in sorting specimens, for it has not been found in N. W. America by any subsequent collector. The South Australian station given by Spring originates in another error, he having mistaken Kangaroo Bottom (Tasmania) for Kangaroo Island.

F. Mueller observes that the capsules (capsule-like sori) are occasionally though very rarely 3-celled, which would justify the restoring the species to *Psilotum* where Brown had placed it, were it not that the habit were so totally different.

## 7. PSILOTUM, Swartz.

Stems dichotomous, with distant notches bearing minute scalelike leaves, sometimes scarcely prominent, occasionally replaced by equally minute bifid bracts. Spore-cases usually 3 together, united in a capsule-like sorus, sessile in the axil of or attached to the bracts, nearly globular, 3-lobed, 3-celled, opening loculicidally in 3-valves. Spores minute, uniform.

A small tropical and subtropical genus common to the New and the Old World. Both the Australian species have a wide range in America and Asia, but perhaps one only in Africa.

Branches, at least the fertile ones angular . . . . . 1. *P. triquetrum*.  
Branches all flat . . . . . 2. *P. complanatum*.

1. *P. triquetrum*, Swartz; Spring, Monogr. Lycopod. ii. 269,—

Rhizome short, intricately branched. Stems erect or pendulous when on trees, from 3 or 4 in. to above 1 ft. long, repeatedly dichotomous in the upper part, the fertile branches 3-angled, the barren ones usually flattened. Scale-like leaves minute and subulate, the bracts subtending the spore-cases equally small and distant but forked. Capsule-like sori globular, about 1 line diameter, attached to the bract below the fork.—R. Br. Prod. 164; Hook. Gen. Filic. t. 87, Filic. Exot. t. 63.

**Queensland.** Rockingham Bay, *Dallachy*; Rockhampton and neighbourhood, *Braun*, *O'Shaughy*; Moreton Bay and other localities in South Queensland, *W. Hill*, *F. Mueller* and others.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Braun*, *A. Cunningham* and many others; New England, *C. Stuart*; Macleay River, *Fitzgerald*; Richmond River, *Mrs. Hodgkinson*; Lord Howe's Island, *C. Moore*, *Fitzgerald*.

In most tropical or subtropical moist regions in the New and the Old World, more rare in Africa.

2. ***P. complanatum***, *Swartz*; *Spring*, *Monogr. Lycop.* ii. 271.—Stems dichotomous as in *P. triquetrum*, but usually longer and looser and the fruiting branches as well as the whole stem flat, varying from 1 to 2 lines broad, rigid or flaccid, the margins alternately notched. Leaves and bracts very minute or almost obsolete. Capsule-like sori smaller than in *P. triquetrum*.—*P. flaccidum*, *Spring*, l. c.

**Queensland.** Rockingham Bay, *Dallachy*; Bowen, *Woolfs*.

Also in tropical Asia and America, the Mascarene and Pacific Islands.

## ORDER CXLVI. MARSILEACEÆ.

No true leaves. Fronds as in Filices proceeding from the rhizome and rolled inwards (circinate) at the top when young; barren ones either reduced to a linear stipes or bearing a leaf-like lamina divided into 4 digitate leaflets; fertile fronds on a shorter stipes or nearly sessile, the lamina recurved with the margins united, forming an ovoid or globular utricle usually called an *involute*. Spore-cases of two kinds as in some Lycopodiaceæ, but arranged as in Filices in sori inside the involucre (*i.e.* on the under surface of the recurved frond), each sorus enclosed in a membranous indusium, apparently dividing the involucre into as many cells.

The Order is limited to the two Australian genera, both of which have a wide range in the New as well as the Old World. They might well be regarded as forming a tribe of Filices, to which they are much more closely allied than to Lycopodiaceæ, with some genera of which they have been frequently associated. I have not seen F. Mueller's collections of this order, but the Kew Herbarium contains authentic specimens of most of A. Braun's species.

Barren fronds with a 4-foliolate lamina. Sori several often numerous, on transverse veins within the involucre . . . . 1. MARSILEA.

Barren fronds linear. Sori 4, vertical, their indusia dividing the globular involucre into 4 cells. Aquatic plant . . . . 2. PILULARIA.











## 1. MARSILEA, Linn.

Rhizome creeping and rooting at the nodes. Barren fronds with a long petiole or stipes, the lamina divided into 4 digitate leaflets, with numerous forked veins radiating from their base. Involucres sessile or stipitate, their stipes often but not always combined at the base with those of the barren fronds as in *Ophioglossæ*. Sori linear, on transverse veins proceeding from the upper side or midrib of the involucre, the indusia often more or less combined, dividing the involucre into 2 series of transverse cells. Each sorus consisting of few macrosporangia, each one surrounded by several microsporangia.

The genus has a wide range in the northern hemisphere and one of the Australian species does not appear to be distinct from the common northern one. The others are probably endemic.

- |   |                             |
|---|-----------------------------|
| Whole plant glabrous. Leaflets obovate. Involucres on stipes not exceeding $\frac{1}{2}$ in. and often very short . . . | 1. <i>M. quadrifolia</i> .  |
| Leaflets narrow-oblong. Involucres hirsute, sessile or nearly so . . .  | 2. <i>M. angustifolia</i> . |
| Leaflets obovate usually hirsute. Involucres hirsute, sessile or nearly so . . .  | 3. <i>M. hirsuta</i> .      |
| Leaflets obovate, often crenate; silky-villous underneath. Involucres on stipes of 1 to nearly 2 in. . . . .            | 4. <i>M. Drummondii</i> .   |

1. *M. quadrifolia*, Linn.; *R. Br. Prod.* 167.—Whole plant quite glabrous. Leaflets on a long stipes, very broadly obovate, quite entire. Involucres obliquely ovoid or almost globular, 2 to 3 lines long, mostly in clusters of 2, 3 or rarely 4, the stipes or peduncles not exceeding  $\frac{1}{2}$  in. and often shorter, more or less united at the base and very shortly so with the base of the stipes of the barren frond.—A. Br. in Berl. Monatsber. 1870, 724; *M. Brownii*, A. Br. l. c. 725.

N. S. Wales. Port Jackson, *R. Brown*.

I can find no difference between these and European specimens except that the stipes of the involucres are usually but not always rather longer and almost but not quite free from that of the barren frond.

2. *M. angustifolia*, *R. Br. Prod.* 167.—Leaflets narrow-oblong, very obtuse truncate or slightly toothed at the end, the stipes slender, filiform, 2 to 3 in. long in Brown's specimens, above 1 ft. in F. Mueller's, glabrous or nearly so. Involucres hirsute and nearly sessile as in *M. hirsuta*, but in the few specimens seen solitary at the nodes.

N. Australia. Islands of the Gulf of Carpentaria, *R. Brown*; Victoria River, *F. Mueller*.

3. *M. hirsuta*, *R. Br. Prod.* 167.—Young ends of the rhizome densely rusty-villous. Leaflets obovate or broadly curcate, sparingly or densely hirsute underneath, the stipes usually long and slender. Involucres small, usually clustered, sessile at the base of the barren fronds or on a stipes shorter than the involucre.—A. Br. in Berl. Monatsber. 1870, 732.

N. Australia. Islands of the Gulf of Carpentaria, *R. Brown*; Victoria River, *F. Mueller*.

**Queensland.** Broad Sound, *R. Brown*; Brisbane River, Moreton Bay, *F. Mueller*; South Queensland, *Hartmann*.

**N. S. Wales.** Port Jackson, *R. Brown*.

**Victoria?** Ballarat, *Bacchus*. The specimens not in fruit and therefore doubtful.

A. Braun had distinguished some small-leaved specimens as a variety which he afterwards published as a species, *M. cuneata*, A. Br. in Berl. Monatsber. 1870, 732. Some specimens show both large and small leaflets.

4. ***M. Drummondii***, *A. Br. in Linnaea*, xxv. 721.—Ends of the rhizome under side of the leaflets and involucre more or less silky-hairy. Stipes of the barren fronds usually long and slender; leaflets broadly obovate-cuneate or fan-shaped, more or less crenate or shortly lobed or rarely quite entire. Involucres larger than in any of the foregoing species, the stipes or peduncles clustered, free from the base, 1 to  $1\frac{1}{2}$  or rarely 2 in. long.—*M. Muelleri*, A. Br. in *Linnaea*, xxv. 721; *M. macropus*, Hook. Ic. Pl. t. 909, Gard. Ferns, t. 63.

**N. S. Wales, Victoria, S. Australia and W. Australia**, ranging over the whole desert interior, the involucre known as a miserable article of food under the name of *Nardoo*. Gathered by numerous cultivators and cultivated in the Berlin Garden (*Drummond*, n. 398).

A. Braun had in the Kew and other herbaria distinguished several varieties upon characters which I fail to appreciate, although he afterwards raised them into ten distinct species, *M. Howittiana*, *M. sericea*, *M. Muelleri*, *M. macra*, *M. oxaloides*, *M. hirsutissima*, *M. Nardoo*, *M. Drummondii*, *M. salicetrix* and *M. elata*, A. Br. in Berl. Monatsber. 1870, 734 to 739. The two minute protuberances at the end of the stipes and base of the involucre vary much in their relative degree of prominence, but appear to me to show no constancy in this respect even on the same plant.

## 2. *PILULARIA*, Linn.

Rhizome filiform, creeping, rooting at the nodes. Barren fronds reduced to a filiform stipes, few or clustered at the nodes. Involucres solitary at the nodes, sessile or shortly stipitate, globular. Sori 2 to 4, vertically adnate, their indusia at first pulpy at length membranous, free from each other but closely contiguous, apparently dividing the involucre into 2 to 4 cells. Spore-cases numerous, the lower ones in each sorus macrosporangia, the upper ones microsporangia and much more numerous.

Besides the Australian species, which is also in New Zealand and in Western Europe, there is a North America one.

1. ***P. globulifera***, Linn.; Hook. Brit. Ferns, t. 57.—Rootstock creeping under water, often to a considerable extent. Filiform barren fronds of a bright green like the leaves of *Isoetes*, varying from 1 to 3 in. long, usually few together at the nodes. Involucres like little pills  $1\frac{1}{2}$  to 2 lines diameter, slightly hairy, sessile or borne on erect or recurved stipes or peduncles, rarely above  $\frac{1}{2}$  in. long.—Hook. f. Fl. Tasm. ii. 159; *P. Novæ Hollandiæ*, A. Br. in Berl. Monatsber. 1863, 435, 1870, 752.

**Tasmania.** Near Penquite, *Gunn*.

**W. Australia,** *Drummond*, n. 991.





## ORDER CXLVII. FILICES OR FERNS.

No true leaves. Plants consisting of a rhizome or rooting or twining stem or simple trunk, emitting either alternate or a terminal tuft of more or less leaflike *fronds*. These consist of a stalk or *stipes*, frequently bearing narrow brown glossy scales especially at the base and on the rhizome, and a simple or variously divided or compound lamina, usually more expanded and leaflike when barren than when fertile, the frond when young rolled inwards or *circinate* at the top (except in *Ophioglossaceæ*). Spore-cases usually small, collected (rarely united) in clusters or patches called *sori* (rarely solitary) on the under surface or margins of the fertile fronds, which are either nearly similar to the barren ones or very narrow resembling simple or branched spikes. Sori either naked, or covered when young with a membrane called *indusium* (or sometimes involucre), variously opening with the growth of the spore-cases, but usually remaining attached to the frond on one or both sides or rarely in the centre.

This beautiful Order is abundant in all moist climates hot or cold, less so in dry and arid countries. The majority of the genera and a considerable number of species are as widely diffused as *Grasses* and *Cyperaceæ*. Of the 38 Australian genera, no less than 20 have a general range over the New and the Old World though some of them may be chiefly tropical others more specially extratropical, 5 more have a wide distribution but are limited to the Old World, 3 are confined or nearly so to New Zealand and the Pacific Islands, one only and that a very distinct monotypic one (*Platyzoma*) is endemic.

The systematic study of Filices has been rendered unusually tedious and complicated, not only by the great variability of the species but chiefly by the enormous multiplication of supposed genera and species, founded upon trifling and vague distinctions, which have been proposed by Pteridologists, especially since the cultivation of Ferns has become so general. In working up the Australian species my labours have been materially lessened by the kind co-operation of Mr. Baker, generally recognised as the best authority on the subject. And although here as in other cases I have throughout examined for myself and drawn up my own characters and descriptions, Mr. Baker had prepared for me the rich Australian collections in the herbaria of Kew and of F. Mueller, and has allowed me at every step to consult him on all points of doubt or difficulty. With regard to genera, I have thought it advisable to adopt the limits proposed in Hecker and Baker's *Synopsis Filium* with the exception only of the genera *Pteris* and *Aspidium* to which I have, following Mettenius, Thwaites and others, given greater extension than that to which they were limited by Hooker.

**TRIBE 1. Ophioglossere.** — *Fronds not circinate, the barren ones leaflike, the fertile spikelike, simple or branched, the stipes of both frequently combined at the base. Spore-cases globular, 2-valved, without any ring, sessile in 2 rows or in small clusters on the spike or its branches.*

Barren and fertile fronds undivided or once forked.

Spore-cases sessile, slightly connate in 2 rows on the rachis of the spike . . . . .

1. OPHIOGLOSSUM.

Barren and fertile fronds branched. Spore-cases

sessile in 2 rows on the branches of the panicle . . . . .

2. BOTRYCHIUM.



Barren fronds 3-partite, with divided segments. Fertile fronds spikelike. Spore-cases in small dense clusters all round the rhachis . . . . . 3. *HELMINTHSTACHYS*.

TRIBE II. *Marattiæ*.—*Spore-cases without any perfect ring, opening in 2 valves or in a longitudinal slit, sessile or united, in 2 rows, in sori forming marginal lobes to the segments or placed on their under surface.*

- Climbing ferns. Sori forming small lobes bordering the pinnules of the divided fronds . . . . . 4. *LYGODIUM*.  
 Erect simple or dichotomous ferns, without expanded laminae. Sori forming small lobes pinnately contiguous and secund. at the ends of the branches . . . . . 5. *SCHIZÆA*.  
 Fronds large, bipinnate. Sori oblong, placed side by side in a continuous row on the under side of the segments near the margin.  
 Spore-cases distinct, sessile in 2 rows . . . . . 6. *ANGIOPTERIS*.  
 Spore-cases in 2 rows, but consolidated into entire boat-shaped sori . . . . . 7. *MARATTIA*.

TRIBE III. *Osmundææ*.—*Spore-cases globular or nearly so without any or with an imperfect or transverse ring, opening in 2 valves or irregularly, few, sometimes solitary, rarely numerous and clustered in sori, on the under surface of the segments or pinnules.*

- Fronds compound, barren ones with flat segments, fertile with linear segments. Spore-cases large, scattered along the longitudinal veins and enclosed in the revolute margins . . . . . 8. *CERATOPTERIS*.  
 Fronds simply pinnate, with small pinnules. Sori of 2 to 4 spore-cases, terminating transverse veins proceeding from the midrib . . . . . 9. *PLATYZOMA*.  
 Fronds dichotomous. Pinnules pinnately distichous. Sori of few spore-cases, attached to one branch of forked veinlets proceeding from the midrib . . . . . 10. *GLEICHENIA*.  
 Fronds bipinnate. Sori of few or numerous spore-cases at the base of or covering the veins proceeding from the midrib . . . . . 11. *TODEA*.

TRIBE IV. *Hymenophyllææ*.—*Spore-cases enclosed, with a perfect ring, sessile or nearly so on a columnar receptacle within a cup-shaped or 2-lobed indusium, embedded in or protruding from the margin of the frond. Fronds of a thin membranous half-pellucid texture.*

- Indusium cup-shaped or tubular, with an entire or shortly 2-lobed margin. Receptacle often exerted . . . . . 12. *TRICHOMANES*.  
 Indusium divided to below the middle into 2 valves. Receptacle usually included. . . . . 13. *HYMENOPHYLLUM*.

TRIBE V. *Cyatheææ*.—*Tree ferns. Fronds large, compound. Spore-cases small, with a more or less oblique ring, sessile on a slightly raised receptacle, in globular sori on the under surface of the fronds.*

- Indusium at first globular enclosing the sorus, at length cup-shaped under it . . . . . 14. *CYATHEA*.  
 Indusium when open attached only by the lower margin and not forming a complete ring, often small and evanescent . . . . . 15. *HEMITELIA*.  
 No indusium . . . . . 16. *ALSOPHILA*.



TRIBE VI. **Polypodieæ**.—*Habit various. Spore-cases small, with a longitudinal or scarcely oblique ring, numerous and stipitate in sori or patches on the under-side or rarely the margins of the frond.*

A. *Sori covered at least when young with an indusium.*

- Sori globular or slightly oblong, Indusium cup-shaped or globular and 2-valved.  
 Sori close to the margin, Indusium adnate on the upper side, opening in 2 valves or leaving a complete ring . . . . . 17. DICKSONIA.  
 Sori and indusium protruding from the margin . . . 18. DEPARIA.  
 Sori close to or near the margin. Indusium adnate at the base only or along the sides forming with the frond a complete cup . . . . . 19. DAVALLIA.  
 Sori linear, marginal. Indusium linear, opening from the margin inwards.  
 Frond simple, linear. Indusium of the texture of the frond, the sorus apparently embedded in a double margin . . . . . 20. VITTARIA.  
 Frond pinnate or bipinnate. Indusium membranous . . . . . 21. LINDSSEA.  
 Sori marginal. Indusium continuous with the margin and opening from the under edge outwards.  
 Fronds pinnate or compound. Veins of the pinnules forked or dichotomous, radiating from the petiole . . . 22. ADIANTUM.  
 Fronds compound. Pinnules penninerved. Sori short. Indusium a small scale recurved over them . . . . . 23. HYPOLEPIS.  
 Fronds compound, with small lobed segments. Sori short or globular. Indusium the slightly altered margins of the lobes curved over them . . . 24. CHEILANTHES.  
 Fronds various. Sori and indusia linear, usually long and continuous . . . . . 25. PTERIS.  
 Sori in a continuous line along the midrib.  
 Sori on both sides of the midrib, the indusium opening from the midrib outwards.  
 Sori at length covering the under surface of the fertile fronds . . . . . 26. LOMARIA.  
 Sori at length confluent over the midrib but distant from the margin . . . . . 27. BLECHNUM.  
 Sori in a single line along the midrib, in a groove of which the edges form the indusium.  
 Frond small, single . . . . . 28. MONOGRAMME.  
 Sori and indusia oblong or shortly linear, parallel to the midrib, on veinlets connecting the forked veins . . . . . 29. DOODIA.  
 Sori and indusia oblong or linear, on veins diverging from the midrib . . . . . 30. ASPLENIUM.  
 Sori orbicular, usually small, as in *Polypodium*, but with an indusium.  
 Indusium concave at the base bearing the sorus . . . 31. CYSTOPTERIS.  
 Indusium attached within the sorus, peltate or orbicular-reniform . . . . . 32. ASPIDIUM.

B. *No indusium.*

- Sori orbicular, usually small, variously arranged on the under surface . . . . . 33. POLYPODIUM.

- Sori marginal as in *Cheilanthes* but the margin unaltered in consistence, though often curved over the young sorus . . . . . 34. *NOTHOLMENA*.  
 Sori linear or oblong, on veins diverging from the midrib, sometimes crowded in an intramarginal line . . . . . 35. *GRAMMITIS*.  
 Sori long, linear, on the longitudinal anastomosing veins of a simple frond . . . . . 36. *ANTROPHYUM*.  
 Sori confluent, at length completely covering the under surface of the fertile fronds or pinnules . . . 37. *ACROSTICHUM*.  
 Spore-cases innumerable in large patches towards the end of the fertile fronds . . . . . 38. *PLATYCERIUM*.

TRIBE I. OPHIOGLOSSÆ. — Barren fronds leaflike ; fertile ones spike-like, simple or branched, the stipes of both frequently combined at the base (the barren lamina then resembling a leaf on the stipes of the fertile one). Spore-cases globular, 2-valved, without any ring, sessile in 2 rows or in small clusters on the spike or its branches. Fronds not circinate in veneration.

### 1. OPHIOGLOSSUM, Linn.

Barren frond leaflike, entire or forked at the end, reticulately veined. Fertile lamina or spike simple, pedunculate. Spore-cases sessile and more or less combined back to back in 2 rows along the rachis, opening in a fissure transverse as to the spike, longitudinal as to the spore-case.

A small genus generally spread over the tropical and temperate regions of the globe. Of the two Australian species one has the wide distribution of the genus, the other is tropical Asiatic.

- Barren frond ovate-lanceolate or linear, resembling a leaf  
 on the peduncle of the spike . . . . . 1. *O. vulgatum*.  
 Barren frond ribbon-like from the base, the spike appearing  
 pedunculate on the lamina . . . . . 2. *O. pendulum*.

1. *O. vulgatum*, Linn. ; *Hook. and Bak. Sya. Filic.* 445. — Rhizome small, knotty. Combined frond solitary, from a few inches to near 1 foot high, the barren leaflike lamina sessile at or below the middle of the stipes, varying from broadly ovate or oblong-lanceolate and 1 to 2 in. long, to ovate and  $\frac{1}{4}$  to  $\frac{1}{2}$  in. long, or narrow-lanceolate or linear and 1 to  $1\frac{1}{2}$  in. long, with every intermediate form and size, copiously reticulate when broad, the veins more longitudinal and slightly anastomosing when the lamina is narrow. Spike varying in length with the size of the plant, with very few to more than a dozen spore-cases in each row. — *Hook. f. Fl. Tasm. n.* 153, t. 169 ; *F. Muell. Fragm. v.* 112 ; *O. gramineum*, Willd. and *O. costatum*, R. Br. *Prod.* 163.

**N. Australia.** Arnhem North Bay, *R. Brown*.











Queensland. Brisbane River, Moreton Bay, *F. Muller* and others; Rockhampton and neighbouring districts, *Bowman*, *Thozet*, *O'Shanesy*.  
**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *Woolfs* and others.  
**Victoria.** Yarra and Murray Rivers, Station Peak, etc., *F. Mueller*.  
**Tasmania.** Common at Formosa, *Gunn*; King's Island, *Neate*.

The species is found in most warm and temperate climates, and everywhere varies so much in the size and shape of the leaflike lamina that it has been divided into a number of species, which the most acute observers in various countries have again united. In Australia some of the larger broad-leaved forms chiefly in N. S. Wales and Queensland, resemble the *O. reticulatum* Linn.; *Bedd. Ferns S. Ind.* t. 70, though not cordate as in *Hook. and Grev. Spec. Filic.* t. 20. The Australian specimens however, especially the southern ones, are generally small and intermediate between broad and narrow, many of them well represented by *O. parvifolium*, *Hook. and Grev.*; *Bedd. Ferns S. Ind.* t. 71, others by *O. ellipticum*, *Hook. and Grev. Ic. Filic.* t. 40, others again narrow as in *O. lusitanicum* Linn.; *Hook. and Grev. Ic. Filic.* t. 80.

**2. *O. pendulum*, Linn.; Hook. and Bak. Syn. Fil. 446.**—Barren frond pendulous from trees and rocks, often many feet long, ribbon-like, entire or rarely forked at the end, leaflike throughout or tapering at the base into a very short stipes. Spike 1 to 6 in. long, on a short peduncle arising from the central line of the frond not very far from the base. Spore-cases in 2 opposite rows as in *O. vulgatum*, buried when young in the continuous margin, at length occupying nearly the whole breadth of the spike.—*Sieb. Fl. Mixt.* n. 278; *Hook. and Grev. Ic. Filic.* t. 19; *Hook. Gard. Ferns*, t. 33; *Bedd. Ferns S. Ind.* t. 269.

**Queensland.** Head of the Brisbane, *W. Hill*; near Rockhampton, *Thozet*, *O'Shanesy*, growing usually out of the tufts of *Platyserium*.  
**N. S. Wales.** Ash Island, *Leichhardt*.

Also in tropical Asia extending on the one hand to the Mascarene, on the other to the Pacific Islands.

**2. BOTRYCHIUM, Swartz.**

Barren fronds pinnate or compound. Fertile fronds with branched spikes, forming a pedunculate panicle. Spore-cases sessile in 2 rows along the branches, marginal but turned inwards, opening in a fissure, transverse as to the rhachis, longitudinal as to the spore-case.

A genus of few species chiefly extratropical, dispersed over the New and the Old World on the northern and southern hemispheres. The Australian species are both very generally distributed.

- Barren frond simply pinnate, apparently sessile or nearly so  
on the stipes of the fertile one . . . . . 1. *B. lunaria*.  
Barren and fertile fronds both compound, their respective  
stipites shortly united or sometimes free . . . . . 2. *B. ternatum*.  
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1. **B. lunaria**, Swartz; Hook. and Bak. Syn. Filic. 447.—Combined frond 3 to 6 or rarely 8 in. high, with a few adnate scales at the base of the common stipes. Barren frond apparently proceeding from the middle of the plant,  $\frac{3}{4}$  to 3 in. long, pinnate, with from 5 to 15 distant pinnae or segments, obliquely obovate-cuneate, fan-shaped or half-moon-shaped,  $\frac{1}{4}$  to  $\frac{1}{2}$  in. broad, of a thick consistence, entire or crenate, the forked veins radiating from the base. Fertile panicle lanceolate in outline,  $\frac{3}{4}$  to 2 in. long, with few short branches, all turned to one side.—Hook. Brit. Ferns, t. 48; Hook. f. Fl. Tasm. ii. 154; F. Muell. Fragm. v. 113; Bedd. Ferns Brit. Ind. t. 208.

**Victoria.** Snowy Plains on the Ovens, Goulbourn, Caboga and Mitta-Mitta Rivers, F. Mueller.

**Tasmania.** Grassy plains, ascending to 4000 ft., Gunn, Archer, C. Stuart.

Widely spread over the temperate and cooler regions of the northern hemisphere, also in extratropical South America.

2. **B. ternatum**, Swartz; Hook. and Bak. Syn. Filic. 448.—Stipites of the barren and fertile fronds free below their division and sometimes from the base. Barren laminae 2 to 5 in. long and at least as broad, tripartite with pinnate divisions. Pinnae ovate-lanceolate in outline, deeply pinnatifid or again pinnate, the segments denticulate. Veins diverging, almost concealed in the thick texture of the frond. Fertile panicle much branched, 1 to 3 in. long and often nearly as broad at the base.—F. Muell. Fragm. v. 113; *Osmunda ternata*, Thunb. Fl. Jap. 329, t. 32; *Botrychium australe*, R. Br. Prod. 164; *B. virginianum*, Hook. f. Fl. Tasm. ii. 154, t. 169, not of Swartz.

**Queensland.** Moreton Bay, F. Mueller; summit of Mount Archer, near Rockhampton, O'Shanesy, Thozet.

**N. S. Wales.** Port Jackson to the Blue Mountains, R. Brown, Woods and others.

**Victoria.** Maroka Valley at an elevation of 4000 ft., F. Mueller.

**Tasmania.** Moist shady places, Gunn; Mersey River, Milligan.

Also in extratropical North America and Asia and in New Zealand.

### 3. HELMINTHOSTACHYS, Kaulf.

Barren frond leaflike, divided. Fertile frond a pedunculate spikelike panicle. Spore-cases globular but free, in dense clusters all round the rachis, opening irregularly in an external slit.

The genus is limited to the single Australian species, which extends over East India, the Malay Archipelago and New Caledonia.

1. **H. zeylanica**, Hook. Gen. Filic. t. 47, 2nd. Cent. Ferns, t. 94, Gard. Ferns, t. 28.—Rhizome thick, creeping, with fleshy fibres. Fronds united in a stipes often 1 ft. long, the fertile leaflike lamina nearly sessile upon it, usually 3-partite, each division deeply pinnatifid.











Segments lanceolate, 3 to 5 in. long,  $\frac{1}{2}$  to 1 in. broad, entire or denticulate, more or less decurrent and confluent at the base. Veins numerous, simple or forked, parallel and diverging from the midrib, all free or rarely anastomosing. Spike or rather spikelike panicle 2 to 4 in. long, the peduncle at least as long above the barren lamina. Clusters of spore-cases short and crowded, each cluster usually terminating in a crestlike appendage (abortive spore-cases?)—Bedd. Ferns S. Ind. t. 69; F. Muell. Fragm. v. 113.

**Queensland.** Rockingham Bay, *W. Hill, Dallahy*; Port Denison and Daintree River, *Fitzalan*; Rockhampton, *Thozet*.

TRIBE II. MARATTIÆ.—Fronds circinate in vernation. Spore-cases without any perfect ring, opening in 2 valves or in a longitudinal slit, sessile or united, in 2 rows, in sori forming marginal lobes to the rhachis or segments, or placed on their under surface.

4. LYGODIUM, Swartz.

Climbing ferns, with long twining stems. Fronds pinnately or in species not Australian dichotomously divided, inserted on the common stem in divaricate pairs, usually on a very short common stalk or petiole. Pinnules usually ovate or lanceolate, at least when barren. Spore-cases globular or transversely oblong, with longitudinal striæ at the upper end, opening in a longitudinal slit, sessile in two rows, in sori forming small lobes bordering the pinnules or in a separate panicle, with a small scale under each spore-case.

A tropical genus widely spread over the New as well as the Old World. Of the three Australian species two have a wide range in the Old World, the third is only in the Pacific Islands.

- Fronds simply pinnate. Pinnules articulate on the petiole.  
Veins all free . . . . . 1 *L. scandens*.
- Fronds simply pinnate or the lower pinnae again pinnate.  
Pinnules articulate on the petiole. Veins often  
anastomosing . . . . . 2. *L. reticulatum*.
- Fronds more or less bipinnate. Pinnules not articulate,  
often decurrent on the petiole. Veins all free . . . . 3. *L. japonicum*.

1. **S. scandens**, Swartz; Hook. and Bak. Syn. Filic. 437.—Stems rather slender, but twining and climbing to a considerable extent, glabrous or slightly pubescent. Fronds of each pair pinnate. Pinnules 5 to 10 or more, from cordate-ovate to oblong-lanceolate or hastate, varying from  $\frac{1}{2}$  to  $1\frac{1}{2}$  in. long, often shortly lobed at the base, and always articulate on a slight thickening of the apex of the petiolule, which persists on the common rhachis after the pinnules have fallen off. Veins forked, free, radiating from the petiolule, with a more or less distinct central nerve. Sori protruding from the margins of pinnules similar to the barren ones, sometimes all very short with 3 to 6 pairs of spore-cases, sometimes in the same specimen 4 to 5 lines

long, with 12 to 15 pairs of spore-cases.—Bedd. Ferns S. Ind. t. 61; *L. microphyllum*, R. Br. Prod. 162; F. Muell. Fragm. v. 113.

**N. Australia.** Port Darwin, *Schultz*, n. 382; Adams Bay, *Hulse*; Liverpool River, *Gulliver*.

**Queensland.** Sandy Cape, Hervey Bay, *R. Brown*; Cape York and Endeavour River, *W. Hill*, *Daemel*, *N. Taylor*; Rockingham Bay, *Dallachy*; Port Denison, *Fitzalan*; Rockhampton, *Thozet*; Brisbane River, Moreton Bay, *A. Cunningham*, *F. Mueller*.

**N. S. Wales.** Tweed River, *Guilfoyle*.

Widely spread over tropical Asia, received also from tropical Africa.

**2. *L. reticulatum*, Schkuhr, Spec. Filic. 139, t. 139.**—Habit of the larger specimens of *L. scandens*, and the pinnules similarly articulate on the petiolule, but usually larger, lanceolate, rather more rigid, often above 2 in. long, the lower ones of the frond often again pinnate, with 3 to 5 secondary pinnules. Veins forked, diverging from a central nerve and occasionally crossing each other or anastomosing. Sori small, usually numerous and crowded along the margins, each with 3 to 12 pairs of spore-cases.—Hook. and Bak. Syn. Filic. 439; *Hydroglossum scandens*, Presl; Bail. Queensl. Ferns, 62.

**Queensland.** York Peninsula, *N. Taylor*; Daintree River, *Fitzalan*; Rockingham Bay, *Dallachy*.

Also in the Pacific Islands.

**3. *L. japonicum*, Swartz; Hook. and Bak. Syn. Filic. 439.**—Fronds pinnate as in *L. scandens*, but the pinnules much longer and narrower, not articulate but often very narrowly decurrent on the petiolule, and usually sprinkled with short hairs, the lower ones of each frond 3-fid or pinnate with 3 to 5 secondary pinnules, the central one lanceolate, varying from 1 to 6 in. long, the lateral ones shorter, entire or toothed when barren, the veins free; fertile fronds either similar to the barren ones or reduced to a branched rhachis. Sori forming short linear marginal lobes as in *L. scandens*.—*L. semibipinnatum*, R. Br. Prod. 162, F. Muell. Fragm. v. 113.

**N. Australia.** Islands off the North Coast, *R. Brown*; Port Darwin, *Schultz*, n. 20; Roper River, *McDouall Stuart*; Etheridge River, *Gulliver*.

**Queensland.** Cape York, *Daemel*; York Peninsula, *N. Taylor*; Endeavour River, *A. Cunningham*, *G. Brown*; Dayman's Isle, *W. Hill*; Rockingham Bay, *Dallachy*.

Spread over the Malayan Archipelago, East Indies and Eastern Asia to Japan.

## 5. SCHIZÆA, Sm.

Rhizome short. Fronds erect, linear, terete or very narrow, simple forked or dichotomous, without expanded laminae. Sori forming small linear pinnules, closely imbricate in a secund spike at the end of the fertile branches, those of the two sides folded against each other with the fructification inside. Spore-cases globular, without any ring,





opening in 2 valves, sessile in 2 rows covering the inner surface of the pinnules, which is really their under side, though from the curvature of the spike it may appear to be the upper one.

The genus extends over tropical and temperate America and the southern hemisphere of the Old World. Of the four Australian species one has the general range of the genus, another is scattered over the southern hemisphere chiefly extra-tropical, a third is in New Zealand, one only is endemic.

- |  |                          |
|--|--------------------------|
| Fronds terete or nearly so, undivided. Soriferous pinnules under 2 lines long . . . . .  | 1. <i>S. fistulosa</i> . |
| Fronds terete or nearly so, mostly bifid. Soriferous pinnules very narrow, 3 to 4 lines long . . . . .                         | 2. <i>S. bifida</i> .    |
| Fronds flat, narrow-linear, undivided. Soriferous pinnules 2 lines long at the base of the spike, tapering to 1 line . . . . . | 3. <i>S. rupestris</i> . |
| Fronds repeatedly dichotomous . . . . .  | 4. <i>S. dichotoma</i> . |

1. *S. fistulosa*, Labill. Pl. Nov. Holl. ii. 103, t. 250.—Fronds densely tufted, 4 to 8 in. long, terete, undivided. Spike of the fertile ones about  $\frac{1}{2}$  in. long, with 6 to 20 pairs of oblong soriferous pinnules scarcely above 1 line long, denticulate or shortly fringed. Spore-cases usually 4 to 8 pairs in each sorus.—Hook. and Bak. Syn. Filic. 429; F. Muell. Fragm. v. 113; *S. bifida*, Hook. f. Fl. Tasn. ii. 152.

**Victoria.** Tawin River, Gipps' Land, F. Mueller; Mount William, Sullican.

**Tasmania,** Labillardiere, R. Brown; near George Town, Gann; Southport, C. Stuart; near Circular Head, F. Mueller.

Also in New Zealand, New Caledonia, Madagascar and Chili.

2. *S. bifida*, Swartz; Hook. and Bak. Syn. Filic. 429.—Fronds terete, 9 to 18 in. high, once forked at or below the middle or rarely undivided. Spike of the fertile ones  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long, the soriferous pinnules very numerous and closely packed, narrow-linear, 3 to 4 lines long, fringed with long cilia. Spore-cases often 20 pair, much smaller than in *S. fistulosa*.—R. Br. Prod. 162; Sieb. Fl. Mixt. n. 228.

**N. Australia.** Near Providence Hill, F. Mueller.

**Queensland.** Port Bowen, R. Brown; Rockingham Bay, Dullachy.

**N. S. Wales.** Port Jackson to the Blue Mountains. Banks and Slander, A. Cunningham, Woolls and others; New England, C. Stuart; Clarence River, Wilson; Macleay River, Fitzgerald; Richmond River, Mrs. Hodgkinson; southward to Twofold Bay, F. Mueller.

**Victoria.** Brighton, F. Mueller.

**Tasmania.** Southport, rare, C. Stuart.

Also in New Zealand. Included by F. Muell. Fragm. v. 113, in *S. dichotoma*.

3. *S. rupestris*, R. Br. Prod. 162.—Fronds rarely above 4 in. long, undivided, flattened, about 1 line broad, tapering to a short filiform stipes. Fertile spike under  $\frac{1}{2}$  in. long, the soriferous pinnules 6 to 8 pair, denticulate but not ciliate, the lower ones about 2 lines long and from that tapering gradually to about 1 line. Spore-cases 10 to 12 pair.—Hook. and Bak. Syn. Filic. 429; F. Muell. Fragm. v. 113; Hook. and Grev. Ic. Filic. t. 48; Hook. Gard. Ferns, t. 42.

**N. S. Wales.** Port Jackson to the Blue Mountains, on damp rocks, rare, R. Brown; A. Cunningham Fraser, Woolls; Illawarra, Johnson.



4. ***S. dichotoma***, Swartz; Hook. and Bak. Syn. Filic. 430.—Fronds 6 in. to above 1 ft. high, dichotomously divided into very numerous branches slightly flattened especially when barren, forming a flat corymbose top, all or most of them in some specimens fertile, in others all or most of them barren. Soriferous pinnules of the fertile spike very narrow and closely contiguous as in *S. bifida*, but usually smaller, varying from 1 to nearly 3 lines long.—R. Br. Prod. 162; Hook. and Grev. Ic. Filic. t. 17; Bedd. Ferns S. Ind. t. 65; F. Muell. Fragm. v. 113; Sieb. Fl. Mixt. n. 227.

**N. Australia.** Port Darwin, Schultz, n. 208; Castlereagh River, Gulliver.

**Queensland.** Northumberland Islands, R. Brown; Cape York, Daemel; Endeavour River, A. Cunningham, N. Taylor, G. Brown; Daintree River, Fitzalan; Cape Sidmouth, covering the ground in large patches, W. Hill; Rockingham Bay and Rockhampton, Dallachy; Brisbane River, Moreton Bay, F. Mueller.

**N. S. Wales.** Paramatta, Walls, and Blue Mountains, Mrs. Culbert, each a single specimen.

Extends over tropical America and Asia, the Mascarene and Pacific Islands, to New Zealand.

## 6. ANGIOPTERIS, Hoffm.

Trunk erect, almost arborescent. Fronds large, bipinnate, the stipes with 2 large persistent auricles at the base. Spore-cases globular, without any ring, opening inwards in 2 valves, sessile in 2 rows in oblong sori, placed side by side in a continuous row near the margin of the segments. No indusium.

The genus is limited by Hooker and others to the single Australian species, ranging over tropical and Eastern Asia to Japan and extending on the one hand to Madagascar and on the other to the Pacific Islands. It has been divided by De Vriese, Monogr. Maratt. 15, and some others into 63 species which, in so far as they may be discriminated, can only be considered as individual variations.

1. ***A. evecta***, Hoffm.; Hook. and Bak. Syn. Filic. 440.—Trunk thick and erect, attaining sometimes 2 or 3 ft. Fronds spreading very broad, sometimes 12 to 15 ft. long, on a more or less pubescent stipes but otherwise quite glabrous, green and shining. Secondary pinnules or segments linear-oblong, 3 to 8 in. long, abruptly acuminate, crenate-serrate or rarely entire. Veins nearly parallel, diverging from the midrib, entire or forked. Spore-cases 4 to 6 pairs in each sorus.—Hook. and Grev. Ic. Filic. t. 36; Hook. Filic. Exot. t. 75.

**Queensland.** Rockingham Bay, W. Hill, Dallachy; Daintree River, Fitzalan.

## 7. MARATTIA, Sm.

Rhizome large, tuberous. Fronds large, twice or thrice pinnate, the stipes with adnate auricles at the base. Spore-cases completely united in 2 rows, in oblong boat-shaped sori, placed side by side in a continuous row close to the margin of the pinnules or between the midrib and the margin, the spore-cases opening inwards in longitudi-

















nal slits without any other external mark to distinguish them, the sorus appearing divided into so many cells in 2 rows.

A genus of few species dispersed over the tropical regions of the New and the Old World and the southern extratropical ones of the Old World. The only Australian species has a general range in the Old World.

1. *M. fraxinea*, *Sw. Ic. Ined. t. 48*.—Fronds 9 to 12 ft. long (*Dallachy*). Secondary pinnules or segments oblong-lanceolate, acuminate, often 8 in. long and  $1\frac{1}{2}$  in. broad, but much smaller in other specimens, with numerous parallel simple or forked transverse veins, the barren point usually serrate, the fertile portion entire or shortly serrate. Boat-shaped sori rather above 1 line long, oblique and close together in a continuous row close to the margin, the vein on which they rest sometimes slightly expanded and fringed, but scarcely so in our Australian specimens; upper surface of the sorus concave, the slits and cells indicating the number of united spore-cases, 5 to 8 pair in each sorus.—*Hook. and Bak. Syn. Filic. 440*; *Bedd. Ferns S. Ind. t. 79*; *M. salicina*, *Sm.*; *F. Muell. Fragm. v. 114*.

**Queensland.** Rockingham Bay, *W. Hill, Dallachy*; York Peninsula, *N. Taylor*; Daintree River, *Pitzalan*; Bowen, *Woolfs*.

**N. S. Wales.** Lord Howe's Island, *C. Moore*, with smaller pinnules and longer sori of 15 to 20 pairs of spore-cases.

Spread over the tropical and southern extratropical regions of the Old World. The species should include several of those proposed by *De Vriese, Monogr. Maratt. 3*.

TRIBE III. OSMUNDEÆ.—Fronds circinnate in venation, divided or compound. Spore-cases globular or nearly so, without any or with an imperfect or transverse ring, opening in 2 valves or irregularly, few, sometimes solitary, rarely many and clustered, in sori on the under surface of the segments or pinnules.

The typical *Osmunda* is not Australian, but is nearly allied to *Todea barbara*.

### 8. CERATOPTERIS, Brongn.

Fertile fronds compound with narrow linear segments. Sori of single globular spore-cases opening irregularly, with an incomplete or rudimentary ring, inserted on longitudinal veins between the midrib and the margins of the segment. Indusium continuous and membranous, formed of the revolute margin of the segment. Spores large, marked with concentric rings.

The genus is limited to the single Australian species which is widely distributed over the tropical regions of the New and the Old World.

1. *C. thalictroides*, *Brongn.*; *Hook. Spec. Filic. ii. 235, Syn. Filic. 174*.—An aquatic or semiaquatic annual fern. Fronds twice or thrice pinnate, the fertile ones 6 in. to 1 ft. high, the secondary or

tertiary pinnae short, with few distinct linear segments  $\frac{1}{2}$  to above 1 in. long, the revolute margins enclosing the fructification the whole length. Barren fronds distinct, shorter and more spreading, with fewer short broad variously shaped segments, flat and of a soft half succulent texture. Spore-cases in the Australian specimens with a broad nearly complete ring as figured by Beddome, Ferns S. Ind. t. 75.—*Parkeria pteridioides*, Hook. Exot. Fl. t. 147; Hook. and Gray. Ic. Filic. t. 97.

**N. Australia.** South Goulburn Island, *A. Cunningham*; Arnhem Land, *F. Mueller*; Gulf of Carpentaria, *Landsborough*.

**Queensland.** Cape York, *Daemel*; Cape York Peninsula, *N. Taylor*; Rockingham Bay, *Dallachy*; Rockingham and neighbouring districts, *Bowman*, *O'Shaughnessy*; Moreton Bay, *F. Mueller*.

### 9. PLATYZOMA, R. Br.

Fronds tufted on a horizontal rhizome, pinnate, the pinnules small and numerous along a simple rhachis. Sori of 2 to 4 spore-cases, terminating simple veinlets proceeding from the midrib, the soriferous end free and incurved between the frond and an inner membrane. Mature spore-cases globular, very deciduous, bursting irregularly, the inner membrane of the pinnule irregularly torn and disappearing.

The genus is limited to the single species endemic in Australia the great difference in fructification as well as in habit appears to me to preclude its union with *Gleichenia* as proposed by *F. Mueller*.

**1. P. microphyllum, R. Br. Prodr. 160.**—Rhizome short, thick, densely covered with long brown setaceous scales. Fronds 6 in. to above 1 ft. high, the rhachis smooth and shining. Pinnae exceedingly numerous, scarcely above 1 line long and broad, the revolute margins almost closed over the midrib so as to give them a globular or ovoid bullate form, glabrous outside, powdery inside especially on the midrib. Soriferous veins 2 or 3 on each side of the midrib.—Hook. and Bak. Syn. Filic. 11, t. 1, f. 1; Guillem. Ic. Pl. Austral. t. 13; *Gleichenia platyzoma*, *F. Muell. Fragm. v. 114*.

**N. Australia.** Gulf of Carpentaria, *R. Brown*, *Gulliver*; Arnhem Land, Fitzmaurice River and Providence Hill, *F. Mueller*; Glenelg River, N. W. Coast, *Martin*.

**Queensland.** Facing Island, *R. Brown*, *W. Hill*; York Peninsula, *Taylor*; Rockingham Bay, *Dallachy*; Downs of the interior, *Mitchell*, *Wells*, *Birch*, *Bowman* and others.

It is not easy in dried specimens to find the perfect sori in situ, for when ripe they are generally seen loose in the pinnule, and the inner membrane which confined them broken up or withered away.

### 10. GLEICHENIA, Sm.

Fronds from a creeping rhizome erect or scrambling, the main rhachis dichotomous, with numerous entire or pinnatifid pinnules,











distichous along the ultimate branches and often also below the last forks. Sori without indusium, of few (2 to 12) spore-cases attached to one branch of forked veinlets, either superficial or slightly embedded in the substance of the frond. Spore-cases surrounded by a transverse ring and opening vertically in 2 valves.

The genus is spread over the tropical and subtropical regions of the New and the Old World, extending into cooler regions in the southern hemisphere. Of the four Australian species one is generally distributed over the area of the genus, the three others extend to New Zealand and New Caledonia, and two of them also into the Malayan Archipelago.

Pinnules divided to the midrib into numerous small segments, each with a single sorus.

Segments flat or with recurved margins, not bullate. Spore-cases usually 3 or 4, near the upper inner angle . . . 1. *G. circinata*.

Segments bullate, the recurved margins almost closed over to the rhachis. Spore-cases usually 2, in a cavity more than half the breadth of the segment . . . 2. *G. dicarpa*.

Pinnules entire or scarcely serrulate. Veinlets pinnate along the midrib, forked, each with a sorus on one branch.

Pinnules green on both sides, continued on the branches of the rhachis below the last fork. Sori of 3 or 4 spore-cases . . . 3. *G. flabellata*.

Pinnules glaucous underneath, only on the last branches of the rhachis above the last fork. Sori of 8 or more spore-cases . . . 4. *G. dichotoma*.

1. *G. circinata*, Swartz, *Syn. Filic.* 165, 394.—Fronds sometimes short, but often repeatedly dichotomous and scrambling to the height of many feet, the main rhachis glabrous or shortly scaly-hirsute. Pinnules numerous along the ultimate branches, 1 to 2 in. long, pinnately divided into numerous ovate or almost orbicular segments, 1 to  $1\frac{1}{2}$  lines diameter, adnate by the broad base, often whitish underneath, flat or the margins more or less recurved or revolute. Sori of 2 to 4 spore-cases, superficial or half immersed in a slight cavity near the upper basal angle of the segments.—Hook. and Bak. *Syn. Filic.* 11; F. Muell. *Fragm.* v. 115; *G. speluncæ*, R. Br. *Prod.* 160; Guillem. *lc. Pl. Austral.* t. 12; Sieb. *Fil. Exs.* n. 87, and *Fl. Mixt.* n. 229; *G. microphylla* (rhachis hirsute) R. Br. *Prod.* 161; Hook. *f. Fl. Tasm.* ii. 130; *G. semivestita*, Labill. *Sert. Austr. Caled.* t. 11; Bedd. *Ferns Brit. Ind.* t. 177; *G. rupestris*, (margins of segments recurved), R. Br. *Prod.* 160.

**N. Australia.** Upper Victoria River, F. Mueller.

**Queensland.** Moreton Bay, F. Mueller.

**N. S. Wales.** Port Jackson to the Blue Mountains, R. Brown, Wodds and others; northward to Macleay River, Dickler; Richmond River, Wilson; southward to Illawarra, Johnson.

**Victoria.** From the Grampians, Sullivan, and Portland, Allitt, to Upper Gipps' Land, F. Mueller.

**Tasmania.** King's Island, R. Brown; common in loose forest land, J. D. Hooker and others.

**S. Australia.** Mount Lofty Ranges, F. Mueller.

Also in New Zealand, New Caledonia and the Malayan Archipelago and Peninsula.

2. *G. dicarpa*, *R. Br. Prod.* 161.—Fronds of the smaller specimens of *G. circinata*, with the rhachis glabrous or scaly-hispid, but the segments, mostly under 1 line diameter, are almost globular and bullate, the revolute margins almost closed over to the rhachis. Sori large in proportion, of 2 or rarely 3 spore-cases, in a broad cavity close to the rhachis, occupying more than half the breadth of the segment.—*Hook. Filic. Exot.* t. 40; *Kunze, Farrenkr.* t. 70, f. 2; *Hook. f. Fl. Tasm.* ii. 131; *F. Muell. Fragm.* v. 115.

**Queensland.** Rockingham Bay, *Dallachy*; Moreton Island, *F. Mueller*.

**N. S. Wales.** Port Jackson, *Woolfs* and others; New England, *Perrott*; Macleay River, *Beckler*; Twofold Bay, *F. Mueller*.

**Victoria.** From the Grampians to Gipps' Land, *F. Mueller* and others.

**Tasmania,** *Labillardière*; Port Dalrymple and Derwent River, *R. Brown*; abundant especially in subalpine districts, *J. D. Hooker*.

*G. alpina*, *R. Br. Prod.* 161, *Hook. and Grev. Ic. Filic.* t. 58, is a smaller and more villous form from the summit of Mount Wellington.

The species is also in New Zealand, New Caledonia and the Malayan Archipelago.

3. *G. flabellata*, *R. Br. Prod.* 161.—Fronds repeatedly dichotomous, attaining 2 to 4 ft. in height. Pinnules numerous along the last branches and continued along the rhachis below the last fork, linear-lanceolate, entire or the margins obscurely undulate, rarely above 1 in. long, dilated and sometimes confluent at the base, 1 to 1½ lines broad, glabrous or with a few scaly hairs underneath, the numerous veinlets proceeding from the midrib forked, one fork bearing below the summit a superficial sorus of 2 to 5, usually 3 or 4, spore-cases.—*Hook. Spec. Filic.* i. 6; *Filic. Exot.* t. 71; *Hook. and Bak. Syn. Filic.* 12; *Hook. fl. Fl. Tasm.* ii. 131; *F. Muell. Fragm.* v. 114.

**Queensland.** York Peninsula, *N. Taylor*; Rockingham Bay, *W. Hill, Dallachy*; Brisbane River, Moreton Bay, *F. Mueller*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown, A. Cunningham* and others; New England, *C. Stuart*; Clarence River, *Wileor*; Tweed River, *C. Moore*; Illawarra, *Johnson*.

**Victoria.** From the Dandenong Range and Grampians, *F. Mueller*, to East Gipps' Land, *Walter*.

**Tasmania.** Damp shady places, not very common, *J. D. Hooker*.

Var. *tenara*, a small alpine form.—*G. tenara*, *R. Br. Prod.* 161.—Mount Wellington, Tasmania, *R. Brown* and others.

The species is also in New Zealand and New Caledonia.

4. *G. dichotoma*, *Hook. Spec. Filic.* i. 12.—Fronds dichotomous. Pinnules undivided, linear or linear-lanceolate as in *G. flabellata*, but only on the last branches of the stipes above the last fork, mostly about 1 in. long, rather rigid, glaucous underneath, dilated and often shortly confluent at the base, the lowest one on the outer side of the rhachis usually longer and more or less pinnatifid. Transverse veinlets proceeding from the midrib branching at the base, one branch bearing near the base a sorus of 8 to 12 spore-cases.—*Hook. and Bak. Syn. Filic.* 15; *Bedd. Ferns S. Ird.* t. 74; *Polypodium dichotomum*,





Thunb.; *Mertensia dichotoma*, Willd.; Schkuhr, Filic. t. 148; *Gleichenia Hermannii*, R. Br. Prod. 161; F. Muell. Fragm. v. 114.

**N. Australia.** Hunter's River, York Sound, *A. Cunningham*; Victoria River, *F. Mueller*; Port Darwin, *Schultz*, n. 187, 486.

**Queensland.** Shoalwater Bay, *R. Brown*; Daintree River, *Fitzalan*; Rockingham Bay, *Dallachy*; Brisbane River, Moreton Bay, *F. Mueller* and others.

**N. S. Wales.** Port Jackson, *Woolfs, Bynoe*.

Dispersed over the tropical and subtropical regions of the New and the Old World. R. Brown in transferring it from *Lycopodium* to *Gleichenia* rejected Thunberg's specific name as being characteristic of the whole genus and therefore no longer appropriate for a single species. Willdenow nevertheless retained Thunberg's name, but placed the plant in *Mertensia*, now generally united with *Gleichenia*. Hooker first adopted Thunberg's specific name under *Gleichenia*, and has been followed by most others. The genera in ferns have been thrown into such confusion and uncertainty that pteridologists acknowledge a right of priority in specific names whatever may have been the genus under which they may have been first published.

## 11. TODEA, Willd.

Trunk or rhizome erect. Fronds compound. Spore-cases globular, without any or only a very obscure transverse ring, opening to the base in 2 valves, clustered in sori on the under surface of the segments.

A genus of few species, dispersed over South Africa, the Malayan Peninsula, the South Pacific Islands and New Zealand. Of the three Australian species one is in South Africa and New Zealand, another in New Guinea and the South Pacific Islands, the third is endemic.

- |   |                        |
|---|------------------------|
| Pinnules of a firm consistence, entire or serrulate. Sori at length covering the base of the lower pinnules | 1. <i>T. barbara</i> . |
| Pinnules of a membranous half pellucid consistence. Sori of few small spore-cases close to the midrib.      |                        |
| Pinnules serrate  | 2. <i>T. Fraseri</i> . |
| Pinnules deeply pinnatifid  | 3. <i>T. Moorei</i> .  |

1. **T. barbara**, *T. Moore*; *Hook. and Bak. Syn. Filic.* 427.—Trunk erect, attaining sometimes 5 ft. Fronds varying from under 2 ft. to above 8 ft. long, glabrous, twice pinnate. Primary pinnae numerous, from 3 or 4 in. to 1 ft. long. Pinnules numerous, of a firm consistence, narrow-lanceolate,  $\frac{1}{2}$  in. to 2 in. long, entire or more frequently serrate, the upper ones decurrent and confluent at the base. Sori on the oblique simple or forked veinlets, usually covering the greater part of the under surface of the lower pinnules of the lower pinnae, the rest of the frond barren. Spore-cases rather large.—*Osmunda barbara*, Thunb.; R. Br. Prod. 163; *Todea africana*, Willd.; Hook. f. Fl. Tasm. ii. 153, t. 168; F. Muell. Fragm. v. 114.

**Queensland.** Rockingham Bay, *Dallachy*; Bowen, *Woolfs*; Moreton Bay, *W. Hill*.

**N. S. Wales.** Port Jackson to the Blue Mountains. *R. Brown*, *Fraser*, *A. Cunningham*; New England, *C. Stuart*; Clarence River, *Wiles*; Illawarra, *Johnson*.

**Victoria.** Grampians, *Wilhelmi*.

**Tasmania.** Abundant on the Yorktown rivulet, scarce elsewhere. *Gouan*, Recherche Bay, *Oldfield*.

Also in South Africa and New Zealand.



2. **T. Fraseri**, *Hook. and Grev. Ic. Filic.* t. 101.—Trunk or rhizome thick and erect. Fronds 1 to 3 ft. long, twice pinnate. Pinnules lanceolate, dark green and of a thin membranous texture like that of *Trichomanes*,  $\frac{1}{2}$  to 1 in. long, deeply serrate. Spore-cases small and few, at the base of the midrib and of a few of the lateral veins of the lower pinnules.—*Hook. and Bak. Syn. Filic.* 427.

**N. S. Wales.** Deep gullies of the Blue Mountains, rare, Bougainville Cataracts, *Fraser*, near Wilson's, *Woolfs*; *Currajong*, *Hillyard*.

Also in New Guinea and the South Pacific Islands.

3 **T. Moorei**, *Bak. in Trim. Journ. Bot.* 1873, 16.—Trunk 1 to  $1\frac{1}{2}$  ft. high, 6 in. diameter. Fronds often 4 ft. long, twice pinnate. Pinnules lanceolate, of the thin membranous consistence of *D. Fraseri*, deeply pinnatifid, with linear-oblong segments denticulate at the end. Spore-cases as in *D. Fraseri* few and small.

**N. S. Wales.** Lord Howe's Island, Mount Gower, *C. Moore, Fitzgerald*.

TRIBE IV. HYMENOPHYLLÉE. — Fronds of a thin membranous consistence and half pellucid, on a creeping rhizome and often small. Spore-cases depressed, with a transverse ring, sessile or nearly so on a columnar receptacle arising from the base of a cup-shaped or deeply 2-valved indusium, embedded in or protruding from the margins of the fronds, and of a consistence nearly similar.

## 12. TRICHOMANES, Linn.

Rhizome creeping, slender as in *Hymenophyllum* or short and rather thick. Fronds usually small, of a delicate membranous half pellucid texture, entire or variously divided and nerved. Sori terminal or lateral. Indusium of the texture of the frond and continuous with it, tubular or turbinate at the base and immersed in the margin of the frond or protruding from it, with a narrow usually spreading border entire or nearly so. Receptacle linear, usually exserted. Spore-cases sessile at or near its base.

A large genus, with the wide geographical range of *Hymenophyllum*, to which it is closely allied, differing only in the shape of the indusium. Of the eleven Australian species none are endemic, one being found also in New Zealand, eight extend more or less over the Indian Archipelago, the Mascarene and South Pacific Islands, and two generally distributed over the tropical regions of the New and the Old World.

Fronds small, undivided or palmately lobed.

- |  |                          |
|--|--------------------------|
| Fronds sessile, orbicular, peltate, $\frac{1}{2}$ to 1 in. diameter . . .                              | 1. <i>T. peltatum</i> .  |
| Fronds oblong or linear-cuneate, entire or rarely 2-lobed, under $\frac{1}{2}$ in. long . . . . .      | 2. <i>T. vitiense</i> .  |
| Fronds orbicular, 3 to 4 lines diameter, palmatifid . . . . .  | 3. <i>T. parvulum</i> .  |
| Fronds deeply divided into 3 to 6 linear denticulate lobes, $\frac{1}{4}$ to near 1 in. long . . . . . | 4. <i>T. digitatum</i> . |
| Fronds pinnately divided, with toothed or shortly lobed segments; veins pinnate or forked.             |                          |







- Fronds (2 to 4 in.) pinnate, with few thin linear-lanceolate pinnules toothed or shortly lobed near the base . . . 5. *T. venosum*.
- Fronds (2 to 4 in.) pinnate with numerous rather thick crowded nearly equal rather broad ciliate-toothed lobes . . . 6. *T. javanicum*.
- Fronds (3 to 5 in.) bipinnate with rather thick pinnatifid pinnules and linear toothed segments . . . 7. *T. rigidum*.
- Fronds twice or thrice pinnately divided or more compound, the ultimate lobes linear thin 1-nerved. Sori lateral.
- Fronds (1 to 2 in.) pinnate, with ovate once or twice pinnatifid pinnules . . . 8. *T. pyxidiferum*.
- Fronds (3 to 8 in.) pinnate, with narrow bipinnatifid pinnules often tapering to a point . . . 9. *T. caudatum*.
- Fronds (4 to 8 in.) bipinnate, with bipinnatifid pinnules.
- Ultimate lobes linear. Indusia above  $\frac{1}{2}$  line long and broad with a broad 2-lobed border . . . 10. *T. apiifolium*.
- Ultimate lobes setaceous. Indusia under  $\frac{1}{2}$  line long, with a small entire border . . . 11. *T. parviflorum*.

1. ***T. peltatum***, Baker in *Journ. Linn. Soc.* ix. 336, t. 8, C.; *Syn. Filic.* 73.—Rhizome filiform. Fronds sessile, orbicular, attached at or near the centre, overlapping each other and closely appressed, about  $\frac{1}{2}$  in. diameter in our Australian specimens, nearly 1 in. in others, entire or shortly and broadly lobed. Veins numerous, entire or forked, radiating from the base or one principal one slightly pinnate. Sori few. Indusia with an oblong tube more or less embedded in the margin, the border narrow, obscurely 2-lobed. Receptacle not exerted.

**Queensland.** Trinity Bay, Bailey.

Also in the islands of the South Pacific.

2. ***T. vitiense***, Baker in *Journ. Linn. Soc.* ix. 338, t. 8, D.; *Syn. Filic.* 74.—Rhizome filiform. Fronds shortly stipitate, oblong or linear-cuneate, entire or rarely 2-lobed, 1-nerved, 3 to 5 lines long. Sorus single, terminal. Indusium with an oblong tube embedded in the margin or scarcely exerted, the border narrow, shortly spreading, entire. Receptacle shortly exerted.—F. Muell. *Fragm.* viii. 32.

**Queensland.** Brisbane River, Bailey.

Also in the Fiji Islands.

3. ***T. parvulum***, Poir.; *Hook. Spec. Filic.* i. 118; *Syn. Filic.* 75.—Rhizome filiform, tomentose or glabrous. Fronds shortly stipitate, ovate-cuneate orbicular or almost reniform, 3 to 4 lines diameter, unequally palmatifid, the deeper lobes reaching below the middle, all obtuse or emarginate. Sori terminal. Indusium with an oblong tube almost entirely embedded in the margin, with a very short slightly spreading border. Receptacle included or shortly exerted.—Bail. *Queensl. Ferns*, 60.

**Queensland.** Rocks near Brisbane, Bailey.

Also in the Mascarene Islands, the Malayan Archipelago, East tropical Asia and the South Pacific Islands.

4. **T. digitatum**, Swartz; *Hook. Spec. Filic.* i. 119; *Syn. Filic.* 76.—Rhizome filiform. Fronds on a rather long capillary stipes,  $\frac{1}{4}$  to  $\frac{1}{2}$  in. long, deeply and unequally divided into 3 to 6 broadly linear obtuse entire or notched lobes, bordered by a few small teeth. Indusia broader than in most species, but embedded in the apex of the lobes, with a very short open entire border.—*T. lanceum*, Bory; *Hook. and Grev. Ic. Filic.* t. 33; *T. calvescens*, V. de Bosch in *Hook. and Bak. Syn. Filic.* 77.

**N. S. Wales**, *Vicary*; Illawarra, *C. Moore*.

Spread over the Mascarene Islands, the Malayan Archipelago and the South Pacific Islands.

5. **T. venosum**, *R. Br. Prod.* 159.—Rhizome woolly-sealy. Fronds on a filiform stipes, of a very delicate texture, 2 to 4 in. or rarely longer, pinnate. Pinnules linear or lanceolate, mostly  $\frac{1}{2}$  to 1 in. long, toothed or with a few short unequal lobes near the base, the veinlets of each pinnule pinnate, with simple or forked branches, the midrib flexuose. Indusium embedded in a short lobe near the base of the pinnule on the inner side, oblong, with a short spreading entire border. Receptacle usually exserted.—*Hook. Spec. Filic.* i. 132; *Syn. Filic.* 82; *Hook. and Grev. Ic. Filic.* t. 78; *Hook. f. Fl. Tasm.* ii. 135; *F. Muell. Fragm.* v. 116.

**N. S. Wales.** Port Jackson, *R. Brown*, *A. Cunningham*, *Wolls*; Clarence River, *Wilcox*; Cape Howe, *Walter*.

**Victoria.** Dandenong Ranges, sources of the Yarra, *F. Mueller*.

**Tasmania.** Derwent River, *R. Brown*; abundant, clothing the trunks of tree-ferns, etc., *J. D. Hooker*.

Also in New Zealand.

6. **T. javanicum**, *Blume*; *Hook. Spec. Filic.* i. 130; *Syn. Filic.* 83; *Gard. Ferns*, t. 37.—Fronds lanceolate in outline, often falcate, 3 to 4 in. long, pinnate. Pinnules numerous, crowded along the rhachis, lanceolate-falcate, shortly stipitate, about  $\frac{1}{2}$  in. long, of a thicker consistence and darker coloured than most species, penniveined, the oblique simple or forked veinlets mostly produced into short setaceous teeth beyond the margin. Indusia few, along the inner margin below the middle, wholly exserted, narrow-oblong, with a small spreading border. Receptacle exserted.—*Hook. and Grev. Ic. Filic.* t. 240; *Bedd. Ferns Brit. Ind.* t. 180.

**Queensland.** Daintree River, *Fitzalan*.

Also in the Malayan Archipelago.

7. **T. rigidum**, Swartz; *Hook. Spec. Filic.* i. 133; *Syn. Filic.* 86.—Rhizome short and thick. Fronds ovate-lanceolate or triangular in outline, 3 to 5 in. long,  $1\frac{1}{2}$  to 3 in. broad at the base, dark and almost coriaceous, bipinnate, with deeply pinnatifid lanceolate pinnules and linear dentate segments, the primary and secondary rhachis winged only towards the end. Indusia partially embedded in the lower inner teeth

or lobes of the tertiary segments, or sometimes wholly free without any winged margins, narrow, with a small spreading entire border. Receptacle exserted. — Bedd. Ferns S. Ind. t. 8; F. Muell. Fragm. v. 115.

**Queensland.** York Peninsula. *Hales's Expedition*, N. Taylor; Rockingham Bay, W. Hill, *Dallocky*; Trinity Bay and Islands off the Coast, *Bailey*; Daintree River, *Fitzalan*; Bowen, *Woolfs*.

**N. S. Wales.** Macleay River, *Fitzgerald*.

Very widely spread over the tropical regions of the New and Old World.

**S. T. pyxidiferum**, Linn.; Hook. Spec. Filic. i. 124; Syn. Filic. 81.—Fronds in the Australian specimens 1 to 2 in. long, ovate or oblong in outline, pinnate. Pinnules ovate, deeply pinnatifid or bipinnatifid, the lower ones usually distinct, the upper ones connected by a winged rhachis; lobes few, linear, 1-nerved. Indusia occupying nearly the whole of short lateral lobes, often several to each pinnule, oblong, with a broad orifice scarcely 2-lobed. Receptacles either very long or scarcely exserted.—Hook. and Grev. Ic. Filic. t. 206.

**Queensland.** York Peninsula, N. Taylor; Bellenden Ker Range, Rockingham Bay, *Dallachy*.

Widely spread over the tropical regions of the New and the Old World.

**9. T. caudatum**, Brackenr. Ferns U. S. Expl. Exped. 256, t. 36, f. 5.—Rhizome creeping, rigid, rather stout. Fronds narrow, thin, 3 to 8 in. long, pinnate with pinnatifid pinnæ or bipinnate with pinnatifid pinnules, the ultimate segments linear, 1-nerved, the upper confluent ones short and rather distant, giving the pinnules an acuminate aspect. Indusia half immersed in the short lower inner lobes of the pinnules or segments, shortly oblong, with a narrow spreading border. Receptacle usually exserted.

**N. S. Wales.** Cape Byron, Port Macquarrie, New England and Illawarra, C. Moore; Tweed River, *Gwilford*; Macleay River, *Fitzgerald*; Kurrajong, Mrs. Parker.

Also in the South Pacific Islands, and closely allied to the tropical American *T. tenerrimum*, Sw. (*T. angustatum*, Carm.) to which it is referred by F. Muell. Fragm. v. 116.

**10. T. apiifolium**, Presl.; Hook. and Bak. Syn. Filic. ed. 2, 86.—Rhizome thick and knotty. Fronds 4 to 8 in. long, broadly ovate-lanceolate in outline, bipinnate with deeply bipinnatifid pinnules. Primary pinnules 1 to 2 in., secondary about  $\frac{1}{2}$  in. long; segments very narrow linear, thin, 1-nerved. Indusia almost embedded in the short inner lower lobes, the tube shortly turbinate, the border spreading often rather broad approaching that of a *Hymenophyllum*. Stipes short or long, hispid at the base with spreading bristles.—*T. meifolium*, Bory; Hook. Spec. Filic. i. 137; Syn. Filic. ed. 1, 86; *T. polyanthos*, Hook. Ic. Pl. t. 703.



**N. S. Wales.** New England, *C. Stuart*; Richmond River, *Mrs. H. Lykins*; Lord Howe's Island, *C. Moore, Fullagar*.

Also in the Malayan Archipelago and South Pacific Islands.

11. *T. parviflorum*, *Poir. Dict.* viii. 83.—Rhizome creeping, rather thick. Fronds broadly lanceolate in outline, 3 to 5 in. long, bipinnate with deeply pinatifid or pinnate pinnules the segments divided into 2 or 3 almost setaceous lobes, giving the whole frond a fennel-like aspect. Indusia the smallest in the genus, not  $\frac{1}{2}$  line long, on little recurved stipes near the base of the pinnules, turbinate, with a scarcely spreading border.—*T. fœniculaceum*, *Bory*; *Hook. Spec. Filic.* i. 135, *Syn. Filic.* 88.

**Queensland.** Rockingham Bay, *W. Hill, Dellarby*; York Peninsula, *N. Taylor*.

Also in the Mascarene Islands and the Malayan Archipelago. *Poir.*'s plant was identified by *Mattenius* from the original specimen, and his name substituted for *Bory*'s by *Kuhn, Filic. Afric.* 35.

### 13. HYMENOPHYLLUM, Sm.

Rhizome slender, creeping, often much branched and matted. Fronds usually small, erect, of a delicate membranous half-pellucid texture, variously divided, the lobes usually linear 1-nerved. Sori terminal or lateral. Indusium of the texture of the frond and continuous with it, more or less cup-shaped at the base, and immersed in the margin of the frond, the exerted portion deeply divided into 2 broad lobes or valves. Receptacle oblong or linear, shorter than the indusium or rarely rather longer. Spore-cases sessile at or near its base.

A large genus, generally dispersed over most tropical and temperate regions of the globe, especially in America. In the northern hemisphere limited to America and the western parts of the Old World, always frequenting shady situations, with a moist atmosphere. Of the eight Australian species one is very generally spread both in the New and the Old World, one extends from East India to New Zealand, one is southern and extratropical in the New and Old World, three are in New Zealand and some South Pacific Islands, two only are endemic, and of these one is scarcely specifically distinct.

- |  |                             |
|--|-----------------------------|
| Lobes of the fronds bordered by a nerve-like margin . . .                      | 1. <i>H. marginatum</i> .   |
| Lobes of the fronds neither bordered nor toothed.                              |                             |
| Stipes filiform not winged.  |                             |
| Frond simply pinnate, with 2- to 5-lobed pinnules . . .                        | 2. <i>H. rarum</i> .        |
| Frond bipinnate, with pinatifid pinnules . . .                                 | 3. <i>H. flabellatum</i> .  |
| Stipes winged. Frond bipinnate . . .   | 4. <i>H. javanicum</i> .    |
| Lobes of the fronds minutely often sparsely, serrulate.                        |                             |
| Fronds ovate or broad, under 1 in. long. Sori terminal.                        |                             |
| Fronds $\frac{1}{2}$ to $\frac{3}{4}$ in. with few entire or bifid lobes . . . | 5. <i>H. minimum</i> .      |
| Fronds $\frac{1}{2}$ to 1 in., with several divided lobes . . .                | 6. <i>H. pumilum</i> .      |
| Fronds usually 2 in. long or more. Sori lateral near the base of the pinnules. |                             |
| Fronds pinnate, with divided pinnules . . .                                    | 7. <i>H. tunbridgense</i> . |
| Fronds thrice pinnate or pinatifid . . .                                       | 8. <i>H. multifidum</i> .   |







1. *H. marginatum*, *Hook. and Grev. Ic. Filic. t. 34*.—Fronds on a short filiform stipes,  $\frac{1}{2}$  to 1 in. long, linear and entire or once or twice forked, with a central nerve and nervelike margins not toothed. Sori solitary and terminal. Indusium about  $\frac{1}{2}$  line long and broad, divided nearly to the base into obovoid-orbicular valves.—*Hook. and Bak. Syn. Filic. 57*.

**N. S. Wales.** Port Jackson or vicinity, *Fraser, Bynoe*.

2. *H. rarum*, *R. Br. Prod. 159*.—Fronds, on a filiform stipes, 2 to 4 in. long, pinnate or deeply pinnatifid; segments or pinnae once or twice forked, or 3- or 5-lobed, or rarely undivided, the upper segments and their lobes confluent with the narrowly winged rhachis, the lowest segments separated by a filiform rhachis; lobes linear, 1-nerved, not toothed. Sori terminal. Indusium as broad as the segment, nearly 1 line diameter, divided to the middle or rather lower into broad rounded valves.—*Hook. and Bak. Syn. Filic. 58*; *Hook. f. Fl. Tasm. ii. 134*; *H. semibicincte*, *Hook. and Grev. Ic. Filic. t. 83*; *H. Gunnii*, *V.D. Bosc. in Hook. and Bak. Syn. Filic. 463*.

**Victoria.** Sealer's Cove, *F. Mueller*.

**Tasmania.** Derwent River, *R. Brown*; abundant in damp forests often clothing trunks of *Dicksonia*, *J. D. Hooker* and others.

Also in New Zealand, South Africa, and extratropical South America.

3. *H. flabellatum*, *Labill. Pl. Nov. Holl. ii. 101, t. 250*.—Fronds ovate or lanceolate in outline, sometimes broad and under 2 in. long, more frequently elongated to 3 to 8 in., twice or thrice pinnatifid, the lower segments or pinnae distant, the rhachis as well as the stipes filiform and not winged, the upper smaller ones confluent with the narrowly winged rhachis, the lobes not dentate. Sori lateral or terminating the smaller lobes. Indusium orbicular or rather broader than long, about  $\frac{1}{2}$  line diameter, deeply divided into entire valves.—*Hook. Spec. Filic. i. 111*; *Hook. and Bak. Syn. Filic. 61*; *Hook. f. Fl. Tasm. ii. 134*; *H. nitens*, *R. Br. Prod. 159*; *Hook. and Grev. Ic. Filic. t. 197*.

**N. S. Wales.** Blue Mountains, *Vicary*; New England, *C. Moore*; Richmond River, *Mrs. Hodgkinson*; Lord Howe's Island, *Fitzgerald*.

**Victoria.** Dandenong Range, Sealer's Cove, Apollo Bay, *F. Mueller*.

**Tasmania.** Derwent River, *R. Brown*; abundant in damp forests, *J. D. Hooker* and others.

Also in New Zealand.

4. *H. javanicum*, *Spreng. ; Hook. Spec. Filic. i. 106, Syn. Filic. 60*.—Fronds ovate or lanceolate in outline, 3 to 4 in. long, twice or thrice pinnatifid, the rhachis winged and the narrow wings continued down the stipes; segments and lobes linear-oblong, obtuse, not dentate. Sori on short lateral lobe. Indusium ovate, about  $\frac{1}{2}$  line long, divided

nearly to the base into entire valves.—*H. flabellatum*, R. Br. Prod. 159, not of Labill.; *H. crispatum*, Wall.; Hook. f. Fl. Tasm. ii. 134; *H. demissum*, F. Muell. Fragm. v. 116, not of Swartz.

**Queensland.** Bellenden Ker Range, *W. Hill*; Rockingham Bay, *Pallucka*.

**N. S. Wales.** Blue Mountains, *Mrs. Calvert*.

**Victoria.** Sealer's Cove, *F. Mueller*; Apollo Bay, *Wilhelmi*.

**Tasmania.** Derwent River, *R. Brown*; abundant in damp woods, *J. D. Hooker* and others.

Also in East India, the Malayan Archipelago and New Zealand.

5. *H. minimum*, *A. Rich. Fl. Nouv. Zel.* 91, t. 14, f. 2.—Fronds on a short filiform stipes, ovate in outline,  $\frac{1}{2}$  to  $\frac{1}{3}$  in. long, deeply divided into 5 to 8 simple or bifid segments, slightly denticulate. Sori usually one only to each frond, terminating the main axis. Indusium nearly 1 line broad, deeply divided into 2 rounded denticulate open valves.—Hook. and Bak. Syn. Fil. 464.

**N. S. Wales.** Lord Howe's Island, summit of Mount Lingbird, *Fullagar*. Also in New Zealand.

6. *H. pumilum*, *C. Moore in Hook. and Bak. Syn. Filic.* 461.—Closely allied to *H. minimum* and possible a large variety. Rhizome filiform, forming broad dense matted patches like *H. tunbridgense*. Fronds ovate or rhomboidal in outline,  $\frac{1}{2}$  to 1 in. long and nearly as broad, deeply pinnatifid, the pinnæ close together, deeply lobed, the lobes few, broadly linear, with more or less denticulate margins. Sori few, terminating short lobes or the main axis. Indusium about 1 line diameter, deeply divided into denticulate or rarely entire valves.

**N. S. Wales.** Mount Tomah, *C. Moore*; Lord Howe's Island, *C. Moore, Fullagar*. These Lord Howe's Island specimens were from insufficient materials described as distinct under the name of *C. Moorei*, Baker, l. c., but further specimens have shown that the supposed distinctions are not constant.

7. *H. tunbridgense*, *Sm.; Hook. Spec. Filic.* i. 95, *Brit. Ferns*, t. 43, *Syn. Filic.* 67.—Rhizome filiform, much branched, with numerous fronds, forming broad densely matted almost mosslike patches. Fronds on a filiform stipes lanceolate in outline, pinnate, rarely above 2 or 3 in. long; the pinnæ deeply divided into 3 to 8 linear lobes minutely denticulate on the margin. Sori sessile or on a very short lobe, solitary at the base of the pinnæ on their upper margin. Indusium ovate or orbicular, about 1 line diameter, divided to much below the middle into more or less denticulate valves.—R. Br. Prod. 159; Hook. f. Fl. Tasm. ii. 153; F. Muell. Fragm. v. 116; Bedd. Ferns S. Ind. t. 265; *H. cupressiforme*, Labill. Pl. Nov. Holl. ii. 102, t. 250.

**Queensland.** Mount Lindsey, *W. Hill*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *Gandickand, Wolls* and others; New England, *C. Stuart*; Lord Howe's Island, *C. Moore*.







**Victoria.** Dandenong and Buffalo Ranges, Apollo Bay, Gipps' Land. *F. M. Hall* ; Portland, *Allitt*.

**Tasmania.** Derwent River, *R. Brown* ; abundant in shady places, *J. D. Hooker* and others.

Widely spread over most temperate and cooler regions of the globe, in the Old World portion of the northern hemisphere a strictly western plant.

**S. H. multifidum**, *Swartz* ; *Hook. Spec. Filic.* i. 98 ; *Syn. Filic.* 69. —Fronds on a filiform stipes, ovate or rhomboidal in outline, thrice pinnatifid, 2 to 4 in. long, the upper segments confluent with the winged rhachis, the lower pinnæ distinct ; lobes linear, bordered by minute teeth. Sori mostly near the base of the primary or secondary pinnæ on their upper margin as in *H. lunbridgense*, from which this species differs chiefly in the much more compound fronds, and in the valves of the indusia which are usually quite entire or obscurely toothed. —*Hook. and Grev. Ic. Filic.* t. 167.

**N. S. Wales.** Lord Howe's Island, *C. Moore*. Also in New Zealand and in the South Pacific Islands.

TRIBE V. CYATHEE.—Trunk arborescent, at least in the Australian species. Fronds large, circinate in veneration, twice or thrice pinnate. Spore-cases numerous, small, with a more or less oblique ring, in globular sori on the under surface of the segments or pinnules.

#### 14. CYATHEA, Sm.

Tree ferns, with large twice or thrice pinnate or in species not Australian simple fronds, the transverse veinlets of the pinnules or segments forked or divided, bearing a sorus on one of their branches, the sori arranged in a single row on each side of the midrib. Sori globular, enclosed when young in a membranous indusium which after bursting leaves a cup or complete ring under the sorus. Spore-cases numerous, sessile or nearly so on a shortly raised receptacle, each with a vertical or oblique ring.

A large tropical or subtropical genus common to the New and the Old World.

Fruiting pinnules entire or slightly crenate-serrate. Sori in parallel lines on each side of the midrib.

Indusium large and long-persistent, enveloping the spore-cases.

Rhachis and pinnules glabrous or nearly so . . . . . 1. *C. Lindseyana*.

Rhachis and under surface of the pinnules cottony or woolly . . . . . 2. *C. arachnoidea*.

Indusium very deciduous leaving only a ring. Rhachis densely cottony white or at length glabrous . . . . . 3. *C. Macarthurii*.

Fruiting pinnules pinnatifid with a sorus opposite each lobe.

Pinnæ 1 to 6 in. long. Pinnules linear, 6 to 9 lines long . . . . . 4. *C. medullaris*.

Pinnæ 1 to 1½ in. long. Pinnules 3 to 4 lines long . . . . . 5. *C. brevipinna*.

1. **C. Lindseyana**, *Hook. Syn. Filic.* 25.—“Trunk 10 to 12 ft. high, 12 inches in circumference.” Rhachis of the fronds in our specimens quite glabrous. Secondary pinnae 3 to 4 in. long. Pinnules much broader than in *C. medullaris*, the lower ones about  $\frac{1}{2}$  in. long and 2 lines broad, the upper ones short and confluent, membranous, glabrous or with a few scaly hairs on the midrib, serrulate but not lobed. Sori in a double row very near the midrib and distant from the margin. Indusium long-persistent, opening irregularly at the apex.

Queensland. Mount Lindsey, *W. Hill*.

2. **C. arachnoidea**, *Hook. Syn. Filic.* 24.—Trunk attaining 15 to 20 ft. Rhachis of the fronds muricate and covered as well as the under side of the segments with a close whitish or ferruginous tomentum. Secondary pinnae 3 to 5 in. long. Pinnules or segments narrow, coriaceous, the lower ones 4 to 6 lines long and distinct, the upper ones smaller and confluent, somewhat coriaceous, the fertile portion with recurved crenulate margins. Sori in a single row on each side of the midrib but occupying nearly the whole breadth. Indusia persistent, globular, bursting irregularly at the apex.—*F. Muell. Fragm.* vi. 200.

Queensland. Rockingham Bay, *Dallachy*. Also in the Moluccas. *Dallachy's* specimens are not in fruit, but are otherwise precisely similar to the Molucca ones from which the above character is taken.

3. **C. Macarthurii**, *F. Muell. Herb.*—Trunk 10 to 12 ft. high. Fronds thrice pinnate, the rhachis densely covered with a whitish woolly tomentum, which however in some specimens has entirely disappeared. Secondary pinnae 3 to 4 in. long. Lower pinnules quite distinct though attached by a broad base, 3 to 5 lines long, minutely serrate-crenulate, the upper ones gradually smaller and confluent, the pinnae ending in a long dentate point. Sori rather small, on the short lateral branches of scarcely prominent forked veinlets, forming a row on each side of the central veins. Indusium complete and globular when young, but soon breaking up, leaving a perfect ring under the sorus or more frequently entirely falling away.—*Hemitelia Macarthurii*, *F. Muell. Fragm.* viii. 176; *Cyathea Moorei*, *Hook. and Bak. Syn. Filic.* 453.

N. S. Wales. Lord Howe's Island, *C. Moore, Lind and Fullagar*.

4. **C. medullaris**, *Swartz; Hook. Spec. Filic.* i. 26. *Gard. Ferns*, t. 25.—Trunk attaining sometimes 40 to 50 ft. densely covered with matted fibres in the lower part, marked higher up with the scars of fallen fronds and muricate at the top with the bases of old fronds. Fronds 10 to 20 ft. long, the rhachis and primary branches sprinkled with small tubercles. Secondary pinnae 4 to 6 in. long, with numerous pinnules, the lower ones distinct, linear, 6 to 9 lines long, crenate or pinnatifid, the upper ones short and confluent into a pinnatifid point. Sori one to each lobe of the pinnule and occupying the greater part of its length. Indusium











broad and short under the sorus, irregularly lobed.—Hook. and Bak. Syn. Filic. 25; Schkuhr, Filic. t. 133; F. Muell. Fragm. v. 116.

**N. S. Wales.** Richmond River, *Woolfs*.

**Victoria.** Cape Otway, *Wilkinson, Marriner*.

**Tasmania.** Near Circular Head, *Gunn, S. B. Emmett*.

Also in New Zealand, the Malayan Archipelago and South Pacific Islands.

5. **C. brevipinna**, *Baker*.—A single specimen of what appears to be the greater part of a frond,  $1\frac{1}{2}$  ft. long. Rhachis thick, scaly-hispid. Primary pinnae about 6 in. long and 3 in. broad; secondary pinnae 1 to  $1\frac{1}{2}$  in. long; pinnules 3 to 4 lines long, rather broad, entire or slightly lobed in the fringing part. Sori large and one to each lobe as in *C. medullaris*, of which however this can scarcely be a variety only.

**N. S. Wales.** Lord Howe's Island, *Lind and Fullagar*.

## 15. HEMITELIA, Br.

Tree ferns, with the habit and principal characters of *Cyathea* and *Alsophila*. Sori in the typical American species towards the end of the venules and on all or most of their branches, but in the Australian one and a few others near the base of one fork as in *Cyathea*. Indusium when open half cup-shaped or semicircular, interrupted on the upper side and often very deciduous.

A tropical or subtropical genus, the typical species all American, the Australian one apparently endemic, but allied to species both in the New and the Old World.

1. **H. Moorei**, *Baker in Gard. Chron.* 1872, 252; *Syn. Filic.* 455. —Trunk 8 to 10 ft. high. Fronds thrice pinnate, scaly-hirsute with a ferruginous pubescence often quite disappearing or leaving a few tubercles. Secondary pinnae lanceolate, 2 to 3 in. long; pinnules when fertile  $\frac{1}{2}$  in. long, deeply toothed or pinnatifid. Veinlets once forked with a sorus at the base of one fork. Sori thus in a single row on each side of the midrib, one opposite each lobe as in *Cyathea*, but the indusium when open dimidiate, being quite or almost interrupted on the upper side.

**N. S. Wales.** Lord Howe's Island, *C. Moore* and others.

*H. Godefroyi*, *Luerss. in Journ. Mus. Godefr.* vi. 4, from Brisbane River, *Amalia Dietrich*, is unknown to us, nor is it known whether it is arborescent or not. It is described from a single frond, which was at first believed to be that of an *Aspidium*, till it was ascertained that the spore-cases were those of a *Cyathea*, with a very small semicircular indusium concealed under the sorus.

## 16. ALSOPHILA, R. Br.

Tree ferns, with large twice or thrice pinnate fronds, the transverse veinlets of the pinnules or segments forked or divided, bearing a sorus on one or more of their branches. Sori globular, without any indusium,

but the small scales scattered on the veins occasionally subtending the sorus. Spore-cases numerous, sessile or nearly so, usually more or less intermixed with hairs on a slightly raised receptacle, each with a vertical or oblique ring.

A large tropical and subtropical genus in the New and the Old World, differing from *Cyathea* only in the want of an indusium. Of the five Australian species one is also in Norfolk Island, the others appear to be endemic.

- |  |                               |
|--|-------------------------------|
| Secondary pinnae undivided, entire or crenate-serrate . . . . .  | 1. <i>A. Rebecca</i> .        |
| Secondary pinnae deeply pinnatifid, the segments all confluent at the base, ovate and entire . . . . .                                 | 2. <i>A. Loddigesii</i> .     |
| Secondary pinnae pinnate at the base, the lower pinnules distinct, the upper ones confluent, all entire serrulate or slightly crenate. |                               |
| Pinnules or segments entire or obscurely crenate, serrulate only when barren or in the barren end . . . . .                            | 3. <i>A. australis</i> .      |
| Pinnules narrow, very neat, usually serrulate with rather small sori . . . . .   | 4. <i>A. Leichhardtiana</i> . |
| Secondary pinnae pinnate, the pinnules almost all distinct narrow and pinnatifid, hispid as well as the rhachis . . . . .              | 5. <i>A. Robertsiana</i> .    |

1. ***A. Rebecca***, *F. Muell. Fragm.* v. 53, 117.—Trunk slender, described by some as 6 ft. high and 1 in. diameter, by others as twice that height and diameter. Secondary pinnae dark and shining, undivided, lanceolate, 2 to 3 in. long, 4 to 5 lines broad or rather more when barren, acuminate, crenate or obtusely serrate, obliquely truncate at the base but not adnate to the rhachis. Transverse veinlets with 3 to 7 branches. Sori rather large, on 2 to 4 of the branches, forming about 2 irregular rows on each side of the midrib.—Hook. and Bak. *Syn. Filic.* 40; Hook.  *Ic. Pl.* t. 1015.

**Queensland.** Rockingham Bay, *Dallachy, W. Hill*; Port Denison and Daintree River, *Fitzalan*; Cape York Peninsula, *W. Hahn's Expedition*.

2. ***A. Loddigesii***, *Kunze in Linnæa*, xviii, 221 (*name only*); *Baker Syn. Filic.* 458.—Fronds apparently shorter than in *A. australis*, the rhachis slightly tomentose or tuberculate, but soon glabrous and smooth. Secondary pinnae 2 to 3 in. long, lanceolate, deeply pinnatifid, the segments all confluent at the base, more ovate than in *A. australis*, 3 to 4 lines long, 2 to 2½ lines broad, obtuse or almost acute, entire; transverse veinlets entire or once forked. Sori rather small, 1 to 4 on each side of the midrib of each segment.

**N. S. Wales.** Cape Byron, *C. Moore*, the specimens perfectly agreeing with a cultivated one received from Kunze.

3. ***A. australis***, *R. Br. Prod.* 158.—Trunk variously described by collectors as from 8 to 70 ft. high, slender or stout, completely covered from the base or only in the upper part with the bases of old fronds. Fronds 5 to 12 ft. long, twice or thrice pinnate, the base of the petiole covered with linear-lanceolate scales mixed with setaceous ones (or with only the one or the other?), the main rhachis and sometimes the

partial ones tuberculate or muricate. Secondary pinnae 3 to 4 in. long; pinnules lanceolate or linear, the lower ones distinct and 4 to 6 lines long, the upper ones shorter and confluent, the soriferous part entire or obscurely crenate, the barren ones and the barren end of the soriferous ones often serrulate. Transverse veinlets usually once forked when soriferous, often with 3 or 4 branches when barren. Sori in 2 rows sometimes extending to the apex and as many as 8 on each side of the midrib, often fewer extending half way or reduced to very few at the base of the segment.—Hook. Sp. Filic. i. 50; Hook. and Bak. Syn. Filic. 40; F. Muell. Fragm. v. 116; Sieb. Syn. Filic. n. 122, Fl. Mixt. n. 241; Hook. f. Fl. Tasm. ii. 132; F. Muell. Fragm. v. 52; *A. excelsa*, R. Br. in Endl. Prod. Fl. Novt. 16; Hook. Spec. Filic. i. 49, t. 18, A.; F. Muell. Fragm. viii. 178; *A. Cooperi*, Hook. and Bak. Syn. Filic. 459.

**Queensland.** Rockingham Bay, *D. Darling*, W. Hill; Port Denison and Daintree River, *Fitzalan*; South Queensland, *Hartman*; Mount Lindsey, *W. Hill*.

**N. S. Wales.** Port Jackson, *R. Brown*; frequent in shaded ravines and permanently damp woods in the immediate coast line, Port Jackson, Illawarra, etc., *A. Cunningham*, *Woolfs* and others; New England, *C. Stuart*; Hastings and Clarence Rivers, *Beckler*, *C. Moore*; Richmond River, *Mrs. Hodgkinson*.

**Victoria.** Dandenong Ranges and Sealer's Cove, *F. Mueller*; Cape Otway, *Walter*; Grampians, *Sullivan*.

**Tasmania.** King's Island, *R. Brown*; not rare in shady forests, *J. D. Hooker* and others.

It is possible that the study of living specimens in their native stations may show characters for distinguishing more than one species, but as far as known the differences in the trunks do not correspond with the very indefinite differences in the fronds. In the typical *A. australis*, chiefly from N. S. Wales and Tasmania, but also among Queensland and Norfolk Island specimens, the ultimate pinnules are thin rather acute barren and serrulate at the end, the sori not reaching beyond the middle. In the Norfolk Island form originally described as *A. excelsa*, the pinnules are longer, narrower, thicker, obtuse with recurved margins, soriferous and entire or obscurely crenate to the end. But some Norfolk Island specimens are the precise counterpart of Brown's from King's Island. The Queensland specimens which gave rise to the *A. Cooperi* are generally intermediate between the two, more frequently approaching the *A. excelsa* form than the typical *australis*. Some specimens from Mount Lindsey and New England, with the recurved margins rather more distinctly crenate, are said to have the stems slender retaining the bases of the fronds only at the top. These may possibly be referrible to *A. Leichhardtiana*. Very few collectors have sent the base of the fronds. These are sometimes covered with flat scales  $\frac{1}{2}$  in. long or more, sometimes with setaceous brown scales only and in one case with the two intermixed.

Var? *nigrescens*. "Stem 10 to 12 ft. high, black and prickly, producing adventitious buds and fronds from the bottom to the top. Fronds large dense and heavy."—Lord Howe's Island, *C. Moore*. Of this there is only a single portion of a frond in Herb. F. Mueller, which shows no character to distinguish it from *A. australis*.

4. ***A. Leichhardtiana*, F. Muell. Fragm. v. 53, 117.**—Very nearly allied to *A. australis* and not easy to distinguish from some of its forms. Trunk generally but not always described as more slender. The fronds have generally a keater aspect, the rachis loosely tomentose or quite glabrous; ultimate pinnules more detached narrower and more



serrate. Sori small, in very distinct series close to the midrib. Base of the stipes (in the very few specimens seen) covered with long brown setaceous hairs without the flattened scales of *A. australis*.—Hook. and Bak. Syn. Filic. ed. 2, 40; *A. Mucarthurii*, Hook. l.c. ed. 1, 40.

**Queensland.** Near Glasshouses, *C. Moore*.

**N. S. Wales.** Port Jackson and Blue Mountains, *Woolfs*; New England, *C. Stuart*; Clarence, Hastings and Macleay Rivers, *Beckler*; Tweed River, *Guilfoyle*; Illawarra, *Shepherd*.

*A. Woolfsiana*, *F. Muell. Fragm.* viii. 179, from Rockingham Bay, *Dallachy*, only differs in the dense woolly tomentum of the rhachis which is more or less observable in some other specimens. *A. Moorei*, *J. Sm. Enum. Cult. Ferns*, 245, is from the synonym given and the specimens grown at Kew the typical *A. Incheburdiana*, although the diagnosis is quite at variance.

5. *A. Robertsiana*, *F. Muell. Fragm.* v. 54, 117.—Trunk 6 to 8 ft. high, 2 to 4 in. diameter. Fronds bipinnate, the rhachis both general and partial as well as the pinnules themselves and sori hispid or sprinkled with rigid hairs. Secondary pinnae 2 to 3 in. long. Pinnules distinct, 4 to 6 lines long, deeply pinnatifid, the upper ones of each pinna smaller more entire and confluent. Sori rather large, solitary opposite each lobe of the pinnule.—Hook. and Bak. Syn. Filic. 459.

**Queensland.** Rockingham Bay, *Dallachy*; Bellenden Ker Range, *W. Hill*.

TRIBE VI. POLYPODIEÆ.—Habit various. Spore-cases small, with a longitudinal or scarcely oblique ring, usually bursting on one side in the shape of little helmets, numerous and stipitate in sori or patches on the under side or rarely on the margins of the fronds, with or without an indusium.

### 17. DICKSONIA, L'Her.

Trunk arborescent or rhizome creeping. Fronds large, compound. Pinnules pinnateveined. Sori terminating veins close to the margins of the frond. Indusium either globular and 2-valved or cup-shaped and entire, the upper valve or upper part of the cup adnate to the frond and continuous with the margin.

The genus extends over the tropical and subtropical regions of the New and the Old World. Of the three Australian species one extends to New Zealand another only to Norfolk Island, the third appears to be quite endemic.

Sori on the concave lobes of the pinnules, which are closely adnate to and form the greater part of the upper valve of the indusium. Tree ferns.

Indusium about  $\frac{1}{2}$  line diameter . . . . . 1 *D. antarctica*.

Indusium about 1 line diameter . . . . . 2. *D. Youngie*.

Sori under the sinus or at the inner base of the lobes of the pinnules. Indusium cup-shaped. Rhizome creeping. 3. *D. davallioides*.

1. *D. antarctica*, *Labill. Pl. Nov. Holl.* ii. 100, t. 219.—Trunk arborescent, "attaining 30 to 50 ft., covered with matted rootlets







giving it sometimes a diameter of 4 ft." Fronds 6 to 12 ft. long, twice or thrice pinnate, the stipes smooth or with setaceous scales, the rhachis glabrous minutely scabrous or softly hairy when young. Secondary pinnae 2 to 3 in. long. Pinnules or segments distinct or the upper ones confluent, nearly flat and acutely toothed when barren, thicker and obtusely lobed when fertile. Sori solitary on each lobe. Indusium globular, about  $\frac{1}{2}$  line diameter, 2-valved, the upper valve adnate to the lobe of the frond and undistinguishable from it except near the base where there is on each side a narrow free margin.—Hook. Spec. Filic. i. 66, Syn. Filic. 59; R. Br. Prod. 157; Hook. f. Fl. Tasm. ii. 132; F. Muell. Fragm. v. 117, vi. 199.

**Queensland.** Toowomba, *Hartmann*; Mount Lindsey, *W. Hill*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *Woolfs* and others; northward to Hastings, Clarence and Macleay Rivers, *Becker*, *C. Moore*; southward to Illawarra, *Shepherd* and others; Twofold Bay, *L. Morton*.

**Victoria.** Mouth of the Glenelg, *Allist*; Grampians, *Salters*; Dandenong, Buffalo Range, Upper Hume River, *F. Mueller*.

**Tasmania.** Abundant in damp, especially subalpine forests, *J. D. Hooker*.

**S. Australia.** Mount Gambier, *F. Mueller*; Lofly Range, *Heyne*.

Also in New Zealand.

**2. *D. Youngiæ*, *C. Moore* in *Bak. Syn. Filic.* 461.**—Trunk "10 to 12 ft. high, 4 in. diameter, marked by the bases of old fronds" (*C. Moore*). "30 ft. high, and 7 ft. circumference," probably including the bases of fronds (*W. Hill*). Fronds more coriaceous and glossy than in *D. antarctica*. Stipes covered with glossy brown hair; rhachis ferruginous-pubescent or glabrous, not scabrous. Secondary pinnae 2 to 3 in. long. Pinnules 3 to 6 lines long when fertile, deeply divided into rounded lobes like those of *D. antarctica* but larger. Indusium 1 line diameter, the upper valve entirely adnate.

**Queensland.** Bellenden Ker Range, *W. Hill*.

**N. S. Wales.** Richmond River, *C. Moore*; Tweed River, *Guilfoyle*; New England, *C. Stuart*.

Appears to be quite distinct from the New Zealand *D. squarrosa*, Sw., to which it is referred by *F. Mueller*, *Fragm.* vi. 200.

**3. *D. davallioides*, *R. Br. Prod.* 158.**—Rhizome creeping. Fronds erect, 2 to 5 ft. high, the rhachis straight or flexuose, smooth and shining. Secondary pinnae 3 to 4 in. long. Pinnules numerous, distinct,  $1\frac{1}{2}$  to  $\frac{3}{4}$  in. long, membranous, pinnatifid, the lowest lobe on the upper side longer than the others. Sori small, globular, almost marginal, in the sinus or at the base of the upper side of the lobes of the pinnules. Indusium cupular, about  $\frac{1}{2}$  line diameter, entire or scarcely lobed, adnate on the upper side to the frond.—Hook. Spec. Filic. i. 71; Syn. Filic. 54; *D. nitidula*, Metten. Filic. Hort. Lips. 103, t. 28; *Dennstaedtia davallioides*, *T. Moore*; Bail. Queensl. Ferns, 54.

**N. S. Wales.** Paterson's River, *R. Brown*; Blue Mountains, *Woolfs* and others; Hastings River, *Becker*; Macleay and Clarence Rivers, *C. Moore*; damp shady woods, Illawarra district, *A. Cunningham*.

**Victoria.** Cape Otway Ranges, *F. Mueller*.

Also in Norfolk Island. Referred by *F. Muell. Fragm.* v. 118, as a variety to *Davallia plicata* (*D. spectans*), from which the attachment and form of the indusium appear to me distinctly to separate it.

**18. DEPARIA, Hook. and Grev.**

Rhizome creeping. Fronds large, compound. Sori globular, terminating a vein, protruding from the margin of the frond and sometimes stipitate beyond it. Indusium membranous, shortly and broadly cup-shaped or 2-valved.

The genus is sparingly distributed over the Pacific islands and South America. Of the two following species one is endemic, the other is a Sandwich Island plant: perhaps not really Australian.

- Fronds simply pinnate with long pinnatifid pinnules . . . 1. *D. prolifera*.  
Fronds twice or thrice pinnate . . . . . 2. *D. nephrodioides*.

1. ***D. prolifera*, Hook. Spec. Filic. i. 85, Syn. Filic. 55, Filic. Exot. t. 82.**—Fronds 2 to 3 ft. long, simply pinnate. Lower pinnae 6 in. to 1 ft. long, deeply pinnatifid; segments ovate or oblong, somewhat falcate,  $\frac{1}{4}$  to  $\frac{1}{2}$  in. long, all connected by a winged rhachis 2 to 3 lines broad. Sori marginal but sessile.—*D. Muere*, Hook. and Grev. Ic. Filic. t. 154; *F. Muell. Fragm.* v. 117.

**N. S. Wales?** A single specimen in herb. *F. Mueller* with the label Illawarra, without the collector's name. The species is otherwise endemic in the Sandwich Islands.

2. ***D. nephrodioides*, Baker in Gardn. Chron. 1872. 253. Syn. Filic. 463.**—Fronds 2 to 3 ft. high, rather firm and shining, twice or thrice pinnate. Secondary pinnae 2 to 3 in. long, pinnate or deeply pinnatifid; lower pinnules pinnatifid,  $\frac{1}{2}$  to 1 in. long, upper ones gradually smaller confluent and toothed only. Sori marginal and prominent but sessile, globose. Indusium very shortly and broadly divided into 2 valves partly formed by a slight dilatation or obtuse tooth of the frond.—*Davallia nephrodioides*, *F. Muell. Fragm.* x. 104.

**N. S. Wales.** Lord Howe's Island, Mount Lingbird, *C. Moore, Lind and Fildes*. This appears to be a true *Deparia* and much more nearly allied to *Dicksonia* than to *Davallia*.

**19. DAVALLIA, Sm.**

Rhizome creeping, often densely covered with soft scales or setae. Fronds compound, often large, or rarely in species not Australian undivided. Sori globular or slightly elongated, terminating veins close











under or at a little distance from the margin. Indusium from under the sorus either with the margins adnate to the frond and forming with it a complete cup enclosing the sorus, or attached only by its broad base and either covering the sorus, or short and open under it.

The genus is widely spread over the tropical and subtropical regions of the Old World extending to the Mediterranean, with a few tropical American species. Of the seven Australian species four have a wide range in the Old World, one is only in Norfolk Island and New Caledonia it really distinct from the Mediterranean one, the two remaining are as far as known endemic.

- Fronds coriaceous. Indusium with adnate margins forming a complete cup.
- Pinnules oblong, obtusely lobed. Indusium narrow-oblong . . . . . 1. *D. solida*.
- Pinnules lanceolate, acutely lobed. Indusium ovate.
- Pinnules marked with raised striæ . . . . . 2. *D. elegans*.
- Pinnules flat, the nerves slightly depressed . . . . . 3. *D. pyxidata*.
- Fronds coriaceous. Indusium attached only by its broad base.
- Fronds rarely above 3 in. long above the stipes. Indusium orbicular, covering the sorus . . . . . 4. *D. pedata*.
- Fronds large and compound. Indusium short and broad under the sorus . . . . . 5. *D. dubia*.
- Fronds membranous. Indusium attached only by its broad base, short and broad under the sorus.
- Secondary pinnæ lanceolate, 2 to 4 in. long. Lower pinnules  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long, broad and pinnatifid, upper ones confluent . . . . . 6. *D. speluncæ*.
- Secondary pinnæ oblong,  $\frac{1}{2}$  to 1 in. long. Pinnules 2 to 4 lines long, with 2 to 4 obovate obtuse lobes . . . . . 7. *D. tripinnata*.

1. *D. solida*, Swartz; Hook. Spec. Filic. i. 163, t. 42, Syn. Filic. 95.—Rhizome rather thick, densely clothed with setose appressed scales. Fronds from under 1 ft. to near 2 ft. long, rather broad, twice or thrice pinnate or pinnatifid. Pinnules coriaceous,  $\frac{1}{2}$  to  $1\frac{1}{2}$  in. long, the lower larger ones distinct and deeply pinnatifid, the upper ones confluent and obtusely lobed. Sori at the base of the crenatures or lobes. Indusium narrow-oblong,  $\frac{3}{4}$  line long, the margins adnate, forming with the frond a complete cup or tube.—Bedd. Ferns Brit. Ind. t. 104.

Queensland, Hummocky Island, Thozet.

Also in the Malayan Archipelago and South Pacific Islands.

2. *D. elegans*, Swartz; Hook. Spec. Filic. i. 164, t. 43, Syn. Filic. 95.—Rhizome thick scaly and woolly. Fronds rather large, 3 or 4 times pinnate, the pinnæ often tapering into long points. Pinnules lanceolate, deeply pinnatifid, coriaceous, smooth shining and elegantly marked with raised striæ distinct from the veins. Sori on small truncate or bidentate lobes or teeth. Indusium ovate, about  $\frac{1}{2}$  line long and broad, the margins adnate and forming with the tube a complete cup, the number of these little shining indusia elegantly contrasting with the darker frond.—R. Br. Prod. 157.

**Queensland.** Endeavour River, *Banks and Schimper, A. Cunningham*; York Peninsula, *N. Taylor*; Rockingham and Cleveland Bays, *W. Hill, Dallachy, Brown*; Fitzroy Island, *Walter*; Rockhampton, *O'Shanesy*.

Widely spread over tropical Asia and Africa.

**3. *D. pyxidata*, Cuv.; Hook. Spec. Filic. i. 169, t. 55, Syn. Filic.** 96. —Rhizome thick, densely covered with soft scales. Fronds usually under 1 ft. long and nearly as broad, on a stipes half as long, twice or thrice pinnate. Pinnules coriaceous smooth and shining, the lobes and segments shorter and broader than in *D. elegans*, without the raised striae of that species, the veins slightly depressed. Sori on the lobes or teeth. Indusium ovate, sometimes as broad as in *D. elegans*, but more frequently rather narrower, the margins alate, when young almost immersed in the frond.—**R. Br. Prod. 157.**

**Queensland.** Brisbane River, Moreton Bay, *F. Mueller* and others; Rockhampton and neighbouring districts, *Dallachy, Thozet, O'Shanesy*; Rockingham Bay, *Dallachy*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown, Sieber, Fl. Mist. n. 240, A. Cunningham* and others; New England, *C. Stuart*; Richmond River, *Mrs. Hopkins*; Hastings and Macleay River, *Becker*; Illawarra, *Johnson*.

Also in Norfolk Island, and New Caledonia, and scarcely to be distinguished from the well-known *D. canariensis* of the West Mediterranean region.

**1. *D. pedata*, Sm.; Hook. Spec. Filic. i. 154, t. 45, Gard. Ferns, t. 7, Syn. Filic. 89.**—Rhizome scaly, often very long. Fronds ovate-triangular,  $1\frac{1}{2}$  to 3 in. long, on a stipes usually as long or longer, coriaceous, deeply pinnatifid, the lowest pair of segments usually again pinnatifid and deeply so on the outer side, the others gradually smaller and entire or scarcely crenate, obtuse or truncate. Sori at the base of the crenatures at the end or upper half of the segments. Indusium nearly orbicular, rather above  $\frac{1}{2}$  line diameter, closely appressed and covering the sorus but attached only by the broad base.—*Humata pedata*, J. Sm.; **Bedd. Ferns S. Ind. t. 12.**

**Queensland.** Cape York Peninsula, *N. Taylor*; Rockingham Bay, *W. Hill, Dallachy*; Bowen, *Woolfs*.

Also in tropical Asia and the Mascarene Islands.

**5. *D. dubia*, R. Br. Prod. 157.**—Fronds large, resembling those of *Dicksonia davallioides* but more rigid, twice or thrice pinnate. Pinnules  $\frac{1}{2}$  to  $1\frac{1}{2}$  in. long, lanceolate, deeply pinnatifid and the lowest segments often again toothed or lobed, somewhat coriaceous. Sori at the base of the obtuse teeth or lobes which are often curved over them as in *Dicksonia* but quite independent of them. Indusium about  $\frac{1}{2}$  line broad and very short, attached only by the broad base as in *D. pedata*, without any trace of the upper valve or complete ring of *Dicksonia*.—**Hook. and Bak. Syn. Fil. 433; Steud. Filic. Exs. n. 111, Fl.**





Mixt. n. 217; *Dicksonia dubia*, Gaudich. in Freye. Voy. Bot. 367; Hook. Spec. Filic. i. 71, t. 24; Hook. f. Fl. Tasman. ii. 132; *Balanium Brownianum*, Presl, Pteridogr. 134.

**Queensland.** Moreton Bay, *F. Muller*; Port Denison and Mount Elliott, *Fitzalan*; Rockingham Bay, *Dallachy*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *A. Cunningham* and others; New England, *C. Stuart*; Hastings River, *Beckler*; Tweed River, *Guilfoyle*; Illawarra, *Johnson*; Lord Howe's Island, *C. Moore*, *Fullagar*.

**Victoria.** Port Phillip, *R. Brown*; Grampians, *S. Brown*; Dandenong, Apollo Bay, Upper Hume River, etc., *F. Mueller* and others.

**Tasmania.** Port Dalrymple, *R. Brown*; Mersey River, *Gunn*, *C. Stuart*.

**6. *D. speluncæ*, Baker, Syn. Fil. 100.**—Fronds large, twice or thrice pinnate. Secondary pinnae lanceolate, 2 to 4 in. long, pinnate in the lower part, pinnatifid towards the end, membranous, hairy underneath as well as the rachis. Lower pinnules  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long, pinnatifid, the upper ones gradually smaller and confluent, reduced towards the end to small lobes. Sori several on each pinnule below the sinus of the lobes, forming 2 rows at some distance from the margin. Indusium broad, short, membranous, slightly toothed or jagged, attached only by the broad base. *-Polypodium speluncæ*, Linn.; *Microlepia speluncæ*, T. Moore; Bail. Queensl. Ferns, 52; *Davallia flaccida*, R. Br. Prod. 157; F. Muell. Fragm. v. 118, *D. polypodioides*, Don; Hook. Spec. Filic. i. 181.

**Queensland.** Endeavour River, *Banks and Solander*; Broad Sound, *Bowman*; Rockingham Bay, *W. Hill*, *Dallachy*.

Widely spread over tropical Asia and Africa.

**7. *D. tripinnata*, F. Muell. Herb.**—An elegant fern of which I have only seen a single frond in herb. F. Mueller, 8 in. long, 6 in. broad at the base, on a hairy stipe of 6 in., thrice pinnate, the main rachis hairy. Primary pinnae lanceolate, secondary oblong  $\frac{1}{2}$  to 1 in. long, pinnules 2 to 4 lines, deeply divided into 2 to 4 obovate obtuse lobes dark green on both sides but rather thin, the lower pinnae and pinnules quite distinct, the upper ones smaller and confluent at the base. Sori few in the specimen under the sinus of some of the smaller lobes. Indusium membranous, broad and somewhat jagged, attached only by the broad base.

**Queensland.** Bellenden Ker Range, *W. Hill*.

## 20. VITTARIA, Sm.

Rhizome creeping. Fronds simple, linear, the very oblique veins connected in an intramarginal vein. Sori continuous along the intramarginal vein, with a two-valved indusium of the substance of the frond,



opening from the outer margin inwards as an inner valve, the margin of the frond recurved over the sorus forming the outer valve, the sorus thus appearing embedded in a double margin of the frond.

The genus is limited to a very few species dispersed over the tropical regions of the globe, the only Australian one extending over tropical Asia, Africa and the Pacific islands.

1. *V. elongata*, Swartz : *Hook. and Bak. Syn. Filic.* 395.—Rhizome creeping, covered with black or purple hairlike scales. Fronds varying from 2 or 3 in. to 2 ft. in length, 1 to 2 lines broad when fertile, 2 to 5 lines when barren, acute obtuse or truncate at the end, gradually tapering into a short stipes, of a rather coriaceous texture. Veins very oblique, sometimes almost parallel with the midrib and all as well as the midrib embedded in the substance of the frond. Sori usually extending nearly the whole length of the fertile fronds.—R. Br. *Prod.* 153; Leurss. in Schenk and Leurss. *Mittheil. Bot. i.* 90, t. 11; Bedd. *Ferns S. Ind.* t. 21.

**Queensland.** Broad Sound, *R. Brown*; Cape York, *Dacot*; Rockingham Bay, *Dallachy*; Daintree River and Mount Elliott, *Fitzalan*; Islands off the coast, *A. Cunningham*.

**N. S. Wales.** Richmond River, *C. Moore*; Macleay River, *Fitzgerald*.

## 21. LINDSÆA, Dryand.

Rhizome creeping or shortly horizontal. Fronds pinnate or compound or in species not Australian undivided. Sori in a continuous or rarely interrupted line under the margin of the frond, with a continuous indusium opening along the upper or outer margin, the margin of the frond sometimes slightly dilated and assuming the appearance of an upper valve. Veins forked, free or anastomosing.

A considerable tropical and subtropical genus, common to the New and the Old World. Of the eleven Australian species five have a wide range in the Old World, two are New Zealand species, one of them also in New Caledonia; the four others appear to be endemic.

Pinnules obliquely flabellate, one side of the base longer than the inner.

Rhizome creeping. Fronds simply pinnate; rhachis black, wiry. Pinnules small, distant . . . . .

1. *L. linearis*.

Rhizome short. Fronds tufted, simply pinnate; rhachis slender. Pinnules small, distant, often bipartite . . . . .

2. *L. dimorpha*.

Rhizome short. Fronds tufted, simply pinnate. Pinnules near together, 3 to 4 lines broad . . . . .

3. *L. cultrata*.

Rhizome creeping. Fronds pinnate and bipinnate. Pinnules often  $\frac{1}{2}$  in. broad.

Veins forked, all free or very rarely anastomosing . . . . .

4. *L. flabellulata*.

Veins in most of the pinnules more or less anastomosing . . . . .

5. *L. lobata*.

Pinnules obovate or cuneate, equilateral. Veins free.

Fronds mostly bipinnate, rather rigid.







- Pinnules obovate or oblong-cuneate, 2 to 3 lines long. . . . . 6. *L. trichomanoides*.  
 Fronds bipinnate, the rhachis slender flexuose. Pinnules cuneate-truncate, 1 to 2 lines long . . . . . 7. *L. microphylla*.  
 Fronds very slender, pinnate. Pinnules small deeply divided into 2 or 3 cuneate lobes, 1 to 2 lines long . . . . . 8. *L. incisa*.  
 Primary pinnules entire lanceolate, or pinnate with short secondary pinnules. Veins anastomosing.  
 Primary pinnules ovate-lanceolate, undivided, 4 to 8 lines long . . . . . 9. *L. Fraseri*.  
 Primary pinnules lanceolate, 1 to 4 in. long, entire or wholly or partially pinnate with short secondary pinnules . . . . . 10. *L. confertifolia*.  
 Primary pinnules lanceolate, coriaceous, entire, woolly-tomentose underneath. Veins free . . . . . 11. *L. lanuginosa*.

1. *L. linearis*, Swartz; Hook. Spec. Filic. i. 206, Syn. Fil. 101.—Rhizome creeping. Frond simply pinnate, the stipes and the rhachis wiry, black and glabrous, from 2 or 3 in. to above 1 ft. high. Pinnules distant, very obliquely cuneate or flabellate almost dimidiate, the base very unequal, 3 to 4 lines broad. Sori forming a continuous line under the outer margin.—R. Br. Prod. 156; Hook. f. Fl. Tasm. ii. 136; Kunze in Pl. Preiss. ii. 113, F. Muell. Fragm. v. 119; Sieb. Fl. Mixt. n. 233.

**Queensland.** Brisbane River, Moreton Bay, F. Mueller, Bailey.

**N. S. Wales.** Port Jackson to the Blue Mountains, R. Brown, A. Cunningham, Wolls and others; New England, C. Stuart; Hastings River, Beckler.

**Victoria.** Dry forest land in the western districts common, Robertson, F. Mueller and others.

**Tasmania.** Abundant in heathy places, J. D. Hooker.

**S. Australia.** Onkaparinga, F. Mueller.

**W. Australia.** King George's Sound to Swan River, Oldfield, Drummond, n. 226, 401, Preiss, n. 1306, and others.

Also in New Zealand, New Caledonia and Norfolk Island.

2. *L. dimorpha*, Bail. Queensl. Ferns, 19.—Rhizome tufted. Fronds simply pinnate, the barren ones mostly 2 in. long or rather more, with a few broad flabellate pinnules toothed and shortly lobed, scarcely oblique. Fertile fronds much longer, the stipes and rhachis very slender and pale-coloured. Pinnules either broadly flabellate very oblique and undivided as in *L. linearis* or once or twice bipartite as in *L. incisa*.—*L. heterophylla*, Prent. in Trim. Journ. Bot. 1873, 295, not of Dryand.

**Queensland.** Near Brisbane, Prentice, Bailey. A very distinct species readily recognised by the slender tufted fronds, although the fertile fronds in the specimens seen are not very perfect.

3. *L. cultrata*, Swartz; Hook. Spec. Filic. i. 203, Syn. Filic. 105.—Rhizome tufted or very shortly creeping. Fronds simply pinnate, 3

to 6 in. long, the stipes and rhachis wiry but slender and pale-coloured. Pinnules near together, occupying the greater part of the frond, very oblique or half-reniform, 3 to 4 lines broad, the rounded outer margin entire, with the sorus and indusium continuous or slightly lobed or denticulate interrupting the sori. —Hook. and Grev. Ic. Filic. t. 114 (a larger state than the Australian specimens); Bedd. Ferns S. Ind. t. 23; *Davallia brachypoda*, Baker, Syn. Filic. 463; *Lindsæa concinna*, J. Sm.; Bail. Queensl. Ferns, 18.

**Queensland.** York Peninsula, *Hahn's Expedition*, N. Taylor; Bellenden Ker Range, *W. Hill*; Gilbert River, *Daintree*.

Also in the Mascarene Islands and tropical and eastern Asia up to Japan.

4. ***L. flabellulata***, Dryand. in Trans. Linn. Soc. iii. 41, t. 8.—Rhizome creeping. Fronds 6 in. to 1 ft. high, usually bipinnate 2 or more of the lower pinne being again pinnate and 2 to 4 in. long, the upper pinne entire, but sometimes the whole frond simply pinnate or in other specimens more or less tripinnate. Pinnules oblique, in the simply pinnate part flabellate or almost rhomboid often  $\frac{1}{2}$  in. broad, smaller in the more compound specimens. Veins forked, free or very rarely here and there anastomosing. Sori continuous round the margin or interrupted.—*L. tenera*, Dryand.; F. Muell. Fragm. v. 119; *L. media*, R. Br. Prod. 156; *L. polymorpha*, Hook. and Grev. Ic. Filic. t. 75.

**N. Australia.** Islands off the North Coast, *R. Brown*; Port Essington, *Armstrong*.

**Queensland.** York Peninsula, N. Taylor; Rockingham Bay, *Dallachy*; Bellenden Ker Range, *W. Hill*; Islands off the coast, *A. Cunningham*, *McGillivray*.

Also in East India and the Malayan Archipelago.

5. ***L. lobata***, Poir.; Hook. and Bak. Syn. Filic. 111.—Rhizome creeping. Fronds 6 in. to 1 ft. high, simply pinnate or bipinnate with few pinnate pinnules at the base, much resembling the less-branched specimens of *L. flabellulata*, but the fertile pinnules often more than  $\frac{1}{2}$  in. broad, and the veinlets frequently anastomosing.

**Queensland.** Endeavour and Bloomfield Rivers, N. Taylor; Rockingham Bay, *Dallachy*; Hull River, *W. Hill*.

Also in East India, the Malayan Archipelago and the South Pacific Islands.

6. ***L. trichomanoides***, Dryand. in Trans. Linn. Soc. iii. 43, t. 11.—Rhizome creeping. Fronds rather rigid, 6 in. to near 1 ft. high, including the long wiry stipes, bipinnate. Primary pinne almost opposite, usually  $\frac{1}{2}$  to 1 in. long; pinnules obovate or oblong-cuneate,

æquilateral, 2 to 3 lines long, the upper ones confluent, all rounded and entire at the end with a continuous sorus, or notched with an interrupted sorus and indusium. Veinlets forked, not anastomosing.—Hook. Sp. Filic. i. 218, Syn. Filic. 110; Hook. f. Fl. Tasm. ii. 136; F. Muell. Fragm. v. 118.

**N. S. Wales?** Illawarra, *Herb. F. Mueller*, collector not named; Kurrajong, *Woolfs*, a small doubtful specimen.

**Tasmania.** Dense forests near Macquarrie Harbour, *Milligan, Gunn*.

Also in New Zealand.

**7. L. microphylla**, *Swartz; Hook. Spec. Filic. i. 218, Syn. Filic. 110.*—Rhizome knotted, shortly creeping. Fronds 6 in. to 1 ft. or rarely  $1\frac{1}{2}$  ft. high, bipinnate, the main rhachis wiry but slender, usually flexuose. Primary pinnæ  $\frac{1}{2}$  to 1 in. or the lower ones nearly 2 in. long. Barren pinnules varying from ovate to lanceolate, toothed or lobed; fertile ones obovate cuneate or almost fan-shaped, equilateral, 1 to 2 or rarely 3 lines broad, undivided with a continuous sorus, or notched or lobed with the sori interrupted.—Hook. and Grev. Ic. Filic. t. 194; Sieb. Fl. Mixt. n. 234; F. Muell. Fragm. v. 119.

**Queensland.** Brisbane River, Moreton Bay, *Fraser, F. Mueller*.

**N. S. Wales.** Port Jackson, *R. Brown, A. Cunningham*; Clarence River, *Wilcox*; New England, *C. Stuart*.

**8. L. incisa**, *Prent. in Trim. Journ. Bot. 1873, 295.*—Very near *L. microphylla*, with the same creeping rhizome, but the stipes and rhachis very slender and pale-coloured. Pinnules small, the fertile ones and most of the barren ones divided to the rhachis into 2 or 3 cuneate segments 1 to 2 lines long, and usually the barren pinnules on the same rhachis as the fertile ones and below them.

**Queensland.** Damp shaded places near Brisbane, *Prentice, Bailey*.

**9. L. Fraseri**, *Hook. Spec. Filic. i. 221, t. 70, Syn. Filic. 112.*—Rhizome creeping. Fronds with a short stipes erect, simply pinnate,  $\frac{3}{4}$  to  $1\frac{1}{2}$  ft. high. Pinnules distant, from almost ovate to lanceolate, equilateral, obtuse, truncate or cordate at the base and shortly petiolate, mostly  $\frac{1}{4}$  to 3 lines long, the upper ones smaller and obovate or rhomboidal, and the barren ones often larger and denticulate, the veinlets frequently anastomosing. Sori marginal, continuous or slightly interrupted.—*Schizoloma Fraseri*, J. Sm.; Bail. Queensl. Ferns, 20.

**Queensland.** Vicinity of Moreton Bay, *Fraser, Leichhardt, A. Cunningham, F. Mueller*.

**10. L. ensifolia**, *Swartz; Hook. Spec. Filic. i. 220, Syn. Filic. 112.*—Rhizome creeping. Fronds simply pinnate, 6 in. to above 1 ft. high. Pinnules exceedingly variable in number size and shape, the barren ones at the base often small, irregularly ovate or obovate but sometimes



lanceolate like the fertile ones, serrulate, rarely lobed; fertile ones in the middle sometimes only 2 or 3, sometimes nearly 20, lanceolate, 1 to 4 in. long, the frond ending in a long lanceolate lobe occasionally broken up into small obovate segments. Veins more or less anastomosing. Sori continued along the whole margin except the short equally cuneate base.—Hook. and Grev. Ic. Filic. t. 111; F. Muell. Fragm. v. 118; *L. lanceolata*, Labill. Pl. Nov. Holl. ii. 98, t. 248; R. Br. Prod. 156; *L. pentaphylla*, Hook. Spec. Filic. i. 219, t. 67; *Schizoloma ensifolium*, J. Sm.; Bedd. Ferns S. Ind. t. 25.

**N. Australia.** North-coast Islands, *R. Brown*; Hunter's River, York Sound, *A. Cunningham*; Fitzmaurice River, *F. Mueller*; Port Darwin, *Schultz*, n. 36, 209.

**Queensland.** Shoalwater Bay and Port Bowen, *R. Brown*; Cape York, *Daemel*; Albany Island, *F. Mueller*; Daintree River, *Fitzalan*; Gilbert River, *Daintree*; Mount Wheeler, *Thozet*; Moreton Bay, *W. Hill*, *F. Mueller*.

Also in the Mascarene Islands, East India, the Malayan Archipelago and South Pacific Islands. Labillardière gives Cape Van Dieman (Tasmania) as the station for his plant. No other collector however has found it there, and it is omitted in J. D. Hooker's Flora. In Hook. Sp. Filic. Labillardière's station is given as North Coast, which Labillardière did not visit. There is no doubt however of the identity of his plant with the common tropical species.

**Var. *heterophylla*.** A few or many or all the pinnae elongated and wholly or partially divided into small pinnules or segments.—Carpentaria Islands, *R. Brown*; York Peninsula, *N. Taylor*; Cape York, *Daemel*; Rockingham Bay, *Dallachy*, *W. Hill*; Daintree River, *Fitzalan*.

Baker is disposed to identify this variety with the Asiatic *L. heterophylla*, Dryand., which is certainly very near it, but with the pinnules usually longer and of a firmer texture.

11. ***L. lanuginosa*, Wall.; Hook. Spec. Filic. i. 210, t. 69, Syn. Filic. 109.**—Rhizome stout, creeping. Fronds 1 to about 2 ft. long, simply pinnate, the rachis densely woolly-tomentose, or the wool at length deciduous. Pinnae numerous, lanceolate, often falcate,  $1\frac{1}{2}$  to  $2\frac{1}{2}$  in. long, not quite sessile, coriaceous, glabrous above, woolly-tomentose underneath at least when young, the fertile ones almost acuminate, the lower barren ones rounded at the end. Veins simple or forked, diverging from the midrib and all free. Sori continuous along the margins except the obliquely truncate base.—F. Muell. Fragm. v. 118.

**Queensland.** Rockingham Bay, *W. Hill*; Edgecombe Bay, *Dallachy*; Port Denison and Daintree River, *Fitzalan*.

Spread over tropical Asia and Africa.

## 22. ADIANTUM, Linn.

Rhizome creeping or tufted. Fronds compound or rarely simple. Pinnules more or less petiolate, often oblique, the forked or dichotomous veins radiating from the petiole to the margin without any midrib.







Sori marginal, short and distinct or rarely elongated and confluent. Indusium continuous with the margin and recurved bearing the spore-cases on its under surface.

A large genus, widely spread over the tropical and temperate regions of the New and the Old World. Of the seven Australian species three are common to the New and the Old World, two extend from New Zealand to tropical Asia and the Pacific Islands, one of them also into Africa, the two remaining ones only into New Zealand, none of them endemic in Australia.

- |   |                                 |
|---|---------------------------------|
| Fronds simply pinnate. Pinnules on long petioles $\frac{1}{2}$ to 1 in. broad. Sori almost continuous . . . . .   | 1. <i>A. lunulatum</i> .        |
| Fronds bipinnate. Pinnules broad divided into cuneate lobes. Sori transversely oblong . . . . .   | 2. <i>A. capillus-veneris</i> . |
| Fronds mostly 3-pinnate. Pinnules broadly obovate nearly equal at the base. Indusia reniform . . . . .  | 3. <i>A. ethiopicum</i> .       |
| Fronds bipinnate or 3-pinnate at the base. Pinnules very oblique or dimidiate. Rhizome creeping. Pinnæ numerous. Pinnules mostly 3 to 4 lines broad. Sori and indusia transversely oblong . . . . . | 4. <i>A. formosum</i> .         |
| Pinnæ fewer. Pinnules more equal, 4 to 8 lines broad. Indusia reniform . . . . .  | 5. <i>A. affine</i> .           |
| Indusia transversely oblong . . . . .   | var. <i>intermedium</i> .       |
| Fronds with few long almost pedate glabrous pinnæ. Pinnules membranous, finely veined. Sori in the sinus, reniform. Rhizome tufted . . . . .  | 6. <i>A. diaphanum</i> .        |
| Fronds more pedate, more or less hispid. Pinnules prominently veined. Sori rounded, contiguous. Rhizome usually tufted . . . . .  | 7. <i>A. hispidulum</i> .       |

1. *A. lunulatum*, *Burm.*; *Hook. Spec. Filic.* ii. 11, *Syn. Filic.* 114.—Rhizome short. Fronds tufted, simply pinnate, 6 in. to near 1 ft. long, the rachis wiry, very slender. Pinnules articulate on slender petioles of 1 to 4 lines, obliquely fan-shaped,  $\frac{1}{2}$  to 1 in. broad. Sori elongated, sometimes continuous along the whole outer margin, but often more or less interrupted.—*Hook. and Grev. Ic. Filic.* t. 104.

**N. Australia.** Port Darwin, *Schultz*, n. 152, 212.

**Queensland.** Rockingham Bay, *Dallachy*.

Spread over the tropical regions of the New and the Old World.

2. *A. capillus-veneris*, *Linn.*; *Hook. Spec. Filic.* ii. 36, *Syn. Filic.* 123.—Rhizome creeping. Fronds bipinnate, broadly ovate in outline, 6 in. to 1 ft. long and sometimes nearly as broad, the rachis capillary. Pinnules on short capillary petioles, broadly obovate or obliquely fan-shaped, 4 to 8 lines broad, more or less divided into cuneate obtuse or truncate lobes, thin, of a bright green. Sori at the end of most of the lobes usually occupying their whole breadth.—*Hook. Brit. Ferns*, t. 41; *Bedd. Ferns S. Ind.* t. 4.

**Queensland.** Wet rocks near Northampton, *O'Shanesy*.

Common in the temperate and subtropical regions of the globe especially in the northern hemisphere, less abundant within the tropics.

3. *A. æthiopicum*, Linn.; Hook. Spec. Filic. ii. 37, t. 77. Syn. Filic. 123.—Rhizome tufted or stoloniferous. Fronds usually 1 to 1½ ft. high, 4 to 8 in. broad, twice three or four times pinnate, the rachis slender shining, often flexuose. Pinnules on short petioles, mostly obovate-orbicular with a more or less cuneate equal base, 3 to 5 lines broad, thin and bright green, broadly crenate or very shortly lobed. Sori distinct in the sinus of the crenatures, the reflexed indusium reniform or at length transversely oblong.—Bedd. Ferns S. Ind. t. 5; Hook. f. Fl. Tasm. ii. 137; F. Muell. Fragm. v. 119; Sieb. Fl. Mixt. n. 241; *A. assimile*. Swartz: Hook. Spec. Filic. ii. 37; R. Br. Prod. 155; *A. trigonum*, Labill. Pl. Nov. Holl. ii. 99, t. 248.

**Queensland.** Broad Sound, Shoalwater and Keppel Bay, *R. Brown*; York Peninsula, *N. Taylor*; Rockingham Bay, *Dallachy*; very numerous localities in southern Queensland, *Bowman*, *O'Shanesy* and others; Maranoa in the interior, *Mitchell*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *Woolfs* and others; northward to New England, *C. Stuart*; Hastings and Macleay Rivers, *Beckler*; southward to Twofold Bay, *L. Morton*; Lord Howe's Island, *Fullagar*.

**Victoria.** Very common from Wendu Vale, *Robertson*, and the Grampians to Gipps' Land, *F. Mueller* and others.

**Tasmania,** *Labillardière*; Pasture lands and rocky places frequent, *J. D. Hooker*.

**S. Australia.** Kangaroo Island, *R. Brown*; Lofty Ranges, *F. Mueller*.

**W. Australia.** King George's Sound to Swan River, *Preiss*, n. 1308; *Drummond*, n. 995 and others.

Widely dispersed over the tropical and temperate regions of the Old World and of Western America.

4. *A. formosum*, *R. Br. Prod.* 155.—Rhizome creeping, scaly. Fronds 1 to 3 ft. high, broadly spreading, 2 to 4 times pinnate, the stipes often scabrous with numerous pinnae, the primary and secondary ones always simply pinnate at the end, the main rachis usually flexuose slender and black. Pinnules membranous or scarcely coriaceous, shortly petiolate, obliquely oblong obovate or rhomboidal, usually 3 to 4 lines rarely only 2 lines long, or larger when barren, the entire sides very unequal, the fruiting margin crenate-toothed. Sori on the teeth or between them. Indusium transversely oblong or somewhat reniform.—Hook. Spec. Filic. ii. 51, t. 86, Syn. Filic. 119; F. Muell. Fragm. v. 120.

**Queensland.** Port Denison, *Fitzinger*; Moreton Bay, *Leichhardt* and others; Ipswich, *Nernst*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown* and many others; New England, *C. Stuart*; Richmond River, *C. Moore* and others; Clarence and Hastings Rivers, *Beckler*; Illawarra, *Johnson*.

**Victoria.** Broadrib and Snowy Rivers, *F. Mueller*.

Also in New Zealand.

5. *A. affine*, *Willd.*; Hook. and Bak. Syn. Fil. 117.—Near *A. formosum*, but much less divided, with larger pinnules more equal in size. Rhizome creeping. Fronds 1 ft. high or more, bipinnate or

tripinnate only in the lower part, Primary pinnae not numerous, 3 to 6 in. long. Pinnules almost sessile, very obliquely ovate or oblong-rhomboidal, 4 to 8 lines broad, the outer margins dentate. Sori marginal, scarcely indented. Indusium broadly reniform.—F. Muell. *Fragm.* v. 119; *A. Cunninghamii*, Hook. *Spec. Filic.* ii. 52, t. 86.

**Queensland.** Maroochie, *Bailey*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *Woolfs* and others; Richmond River, *C. Moore*; Macleay River, *Fitzgerald*.

Also in New Zealand.

*Var. intermedium.* Fronds and pinnules of *A. affine*, but the indusia transversely oblong as in *A. formosum*.—Rockingham Bay, *Dallachy*; Port Jackson to the Blue Mountains, *Woolfs*.

6. *A. diaphanum*, *Blume*; *Hook. Spec. Filic.* ii. 10, t. 80, *Syn. Filic.* 117.—A much smaller and more delicate plant than *A. affine*. Rhizome tufted. Fronds 6 in. to 1 ft. high including the slender stipes, with 2 to 5 primary pinnae 3 to 6 in. long, the lower ones sometimes with 1 or 2 secondary ones at the base. Pinnules numerous, very shortly petiolate, obliquely ovate-rhomboidal with very unequal bases, thinly membranous, 3 to 6 lines broad, the outer margin dentate. Sori in the sinus of the teeth. Indusium deeply reniform.—*A. affine*, Hook. *Spec. Filic.* ii. 32, not of Willd.

**Queensland.** Rockingham Bay, *Dallachy*; Daintree River, *Fitzalan*; southern districts, *Leichhardt*, *Hartmann*.

**N. S. Wales.** Richmond River, *C. Moore*.

Also in the Malayan Archipelago. South China, the South Pacific Islands and New Zealand.

7. *A. hispidulum*, *Swartz*; *Hook. Spec. Filic.* ii. 31, *Syn. Filic.* 126.—Rhizome tufted or rarely creeping. Fronds when perfect once or twice forked at the base, each branch ending in a long pinna or pinnately divided at the base or higher up into secondary pinnae. Pinnules numerous, very shortly petiolate, obliquely ovate-rhomboid, 3 to 8 lines long or broad, rather rigid, prominently veined, the under surface as well as the rhachis more or less hispid. Sori usually almost contiguous though not confluent. Indusia much recurved, orbicular, slightly reniform.—*Bedd. Ferns S. Ind.* t. 3; *F. Muell. Fragm.* v. 120.

**Queensland.** Shoalwater Bay, *R. Brown*; very numerous stations from York Peninsula, *N. Taylor*, and Rockingham Bay, *Dallachy* and others, to Brisbane River, *F. Mueller* and others; and in the interior on the Maranoa, *Mitchell*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown* and others; northward to the Queensland frontier from numerous collectors; southward to Two-fold Bay, *F. Mueller*; Lord Howe's Island, *C. Moore*, *Fullagar*.

**Victoria.** Genoa River, *F. Mueller*.

Extends over tropical Asia and Africa, the Pacific Islands and New Zealand.



## 23. HYPOLEPIS, Bernh.

Rhizome creeping. Fronds compound, usually large, the pinnules penniveined. Sori marginal, short, in the sinus of the teeth of the pinnules. Indusium a small scale continuous with the margin, recurved over the sorus, the spore-cases attached at its base.

The genus comprises but few species dispersed over the tropical and subtropical regions of the New and the Old World, the only Australian species being limited to the Old World.

1. *H. tenuifolia*, Bernh.; Hook. Spec. Filic. ii. 60, t. 89, 90, Syn. Filic. 129.—Fronds 4 to 5 ft. high including the stipes and often above 1 ft. broad, 3 or 4 times pinnate. Tertiary pinnae lanceolate, deeply pinnatifid or pinnate; fruiting pinnules or segments 2 to 4 lines long, crenate-toothed. Rachis and under side of the segments usually slightly hairy. Sori few or several to each segment in the sinus of the teeth, the reflexed scale-like indusium at first often covering the sorus but in an advanced stage almost concealed under the sorus or quite withered away.

Queensland. Rockingham Bay, Dalman; Daintree River, Fitzgerald.

N. S. Wales. Richmond River, C. Moore; Lord Howe's Island, very abundant, C. Moore, Fitzgerald and others.

Also in the Malayan Archipelago, the South Pacific Islands and New Zealand, but not in Tasmania. The fronds, especially in an advanced state of fructification, bear a striking resemblance to those of *Pteris longiraphe*, and are sometimes confounded with it in herbaria, but, if the insertion of the sori be carefully examined, the two plants will I believe always be readily distinguished.

## 24. CHEILANTHES, Swartz.

Rhizome tufted or creeping. Fronds usually small, twice or thrice pinnate with small lobed segments. Sori globular and distinct at the end of the veinlets or oblong by the confluence of 2 or more, all marginal, the slightly altered teeth or lobes bent over them and forming an indusium with the spore-cases inserted at their base as in *Pteris*. Veinlets forked from a central nerve.

A considerable genus widely spread over the tropical and temperate regions of the New and the Old World, scarcely differing from *Pteris* in the greater distinctness of the sori. Of the two Australian species one is Asiatic, the other, if truly distinct, is endemic.

Ultimate lobes of the fronds obovate or oblong 1 to 2 lines

long, or rarely ovate-lanceolate and larger . . . . . 1. *C. tenuifolia*.

Pinnules ending in a linear lobe usually about  $\frac{1}{2}$  in. long . . . 2. *C. caudata*.

(See also NOTHOLÆNA, where the margin forms a spurious indusium.)

1. *C. tenuifolia*, Swartz; Hook. Spec. Filic. ii. 82, t. 87, Syn. Filic. 138.—Rhizome horizontal or shortly creeping often knotty. Fronds from 2 or 3 in. to nearly 1 ft. high, from narrow lanceolate to

















broadly ovate-triangular in outline, the stipes and main rachis glabrous or scaly-hairy. Primary pinnae nearly opposite in distinct pairs, exceeding variable in form and division, from under  $\frac{1}{2}$  in. long with few entire ovate segments, to above 2 in. long and broad, elegantly pinnate a second and a third time, the tertiary pinnules deeply pinnatifid, the ultimate segments in all cases ovate or oblong obtuse 1 to 2 lines long, with every intermediate between these extremes, or rarely the primary segments ovate-lanceolate obtuse  $\frac{1}{2}$  in. long and scarcely lobed, the whole pinnae quite flat or with a very crisped aspect from the recurved or revolute margins. Sori usually numerous round the margins, nearly contiguous, with the small rounded teeth or lobes bent over them.—R. Br. Prod. 155; Sieb. Filic. Exs. 116, Fl. Mixt. n. 250; Kunze in Pl. Preiss. ii. 111; Hook. f. Fl. Tasm. ii. 138; F. Muell. Fragm. v. 122; Bedd. Ferns S. Ind. t. 188; *C. Sieberi*, Kunze in Pl. Preiss. ii. 112; Hook. Spec. Filic. ii. 83, t. 97; *C. Preissiana*, Kunze l. c.; *C. configna*, Bak. Syn. Filic. 476; *Pteris nudiuscula*, R. Br. Prod. 155; *Pellaea nudiuscula*, Hook. Spec. Filic. ii. 151.

**N. Australia.** Islands off the North Coast, *R. Brown*; Victoria River and Sea Range, *F. Mueller*; Escape Cliffs, *Hall*; Port Darwin, *Schultz*, n. 35, 207, 307, some specimens above 1 ft. long,

**Queensland, N. S. Wales** (including Lord Howe's Island). **Victoria, Tasmania, S. and Central Australia, W. Australia.** Evidently very abundant especially in stony rocky situations throughout these colonies, the stations indicated for too numerous to particularise, the western ones including *Durmit*, d's n. 498, and *Preiss*'s n. 1304, 1305, 1307, and collected in all except Tasmania by *R. Brown*.

The species extends over East India chiefly in hilly districts. Eastern Asia and the Malayan Archipelago. Some specimens, including *Cheilanthes hirsuta*, Metten., come very near to some of *Notholana villosa*, especially when the fructification is advanced and the indusium opened out.

2. ***C. caudata***, R. Br. Prod. 156.—Perhaps a variety of *C. tenuifolia*, but the few specimens seen have a very different aspect. Fronds 6 to 8 in. long, slender, bipinnate at least at the base, the pinnae not numerous, all whether primary or secondary ending in a narrow-linear pinnule, usually at least  $\frac{1}{2}$  in. long, continuous or interrupted at the base, and soriferous throughout, the few segments at the base of the pinnae shortly linear.

**Queensland.** Endeavour River, *Banks and Solander*; Port Bowen, *R. Brown*; Gilbert River, *Daintree*.

*Pteris nitida*, R. Br. Prod. 155, (*Pellaea nitida*, Bak. Syn. Filic. 478), is probably this plant. There was no specimen so named found in his herbarium, but from his diagnosis it would appear that he had at first placed it in *Pteris* next to *P. nudiuscula* (which proves to be the *Cheilanthes tenuifolia*), and in subsequently transferring the two to *Cheilanthes* he had accidentally omitted to erase them from *Pteris*.

## 25. PTERIS, Linn.

Rhizome short and thick or creeping. Fronds usually large and compound rarely small or simple. Veins simple forked or reticulate,

with or without a midrib. Sori linear, continuous or slightly interrupted along the margin of the segments, with a continuous narrow membranous indusium proceeding from the margin and opening along the inner or lower edge. Spore-cases inserted on the frond under the indusium.

A large genus distributed over the temperate as well as the tropical regions of the globe. Of the twelve Australian species five have a general distribution in both the New and the Old World, four are limited to the Old World, two more to New Zealand and the South Pacific Islands, one only is as far as known endemic.

- Veins oblique on the midrib, forked and free, but almost concealed in the thick substance of the frond.
- Fronds 2 to 4 in. long and broad, 3-partite with deeply pinnatifid divisions . . . . . 1. *P. geraniifolia*.
- Fronds 6 to 18 in. long, simply pinnate with distinct not decurrent undivided pinnules.
- Rhachis usually glabrous. Pinnules broad,  $1\frac{1}{2}$  to  $2\frac{1}{2}$  in. long, shortly petiolate . . . . . 2. *P. paradoxa*.
- Rhachis scaly-hirsute.
- Pinnules lanceolate, 1 to 2 in. long, sessile . . . . . 3. *P. falcata*.
- Pinnules orbicular or broadly oblong, very obtuse,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long . . . . . 4. *P. rotundifolia*.
- Veins transverse on the midrib, simple or forked, free, apparent on the membranous frond.
- Fronds pinnate.
- Pinnæ numerous, narrow, undivided, 3 to 6 in. long . . . . . 5. *P. longifolia*.
- Pinnæ few, narrow, 2 to 4 in. long, undivided or with few short lateral lobes; barren pinnules short and broad . . . . . 6. *P. ensiformis*.
- Pinnæ many, narrow, 4 to 6 in. long, some undivided others with few lobes . . . . . 7. *P. umbrosa*.
- Pinnæ 4 to 8 in. long, deeply pinnatifid with numerous narrow segments . . . . . 8. *P. quadriaurita*.
- Fronds large, 2 to 4 times pinnate, segments decurrent.
- Segments glabrous narrow, rather regular. Indusium not thickened at the base . . . . . 9. *P. tremula*.
- Segments often very unequal, usually hairy underneath between the raised midrib and the sorus. Indusium from a thickened base . . . . . 10. *P. aquilina*, var.
- Veins from an irregular midrib oblique branched occasionally anastomosing. Frond large compound . . . . . 11. *P. incisa*.
- Veins copiously reticulate on each side of the midrib (*Litobrochia*). Frond-branches pinnate. Pinnæ deeply pinnatifid.
- Frond 3-partite. Segments of the pinnæ connected by a uniform winged rhachis 2 to 3 lines broad . . . . . 12. *P. marginata*.
- Frond with several branches. Segments of the pinnæ decurrent on the rhachis . . . . . 13. *P. comans*.

1. ***P. geraniifolia***, Raddi, *Filic. Bras.* 46.—Rhizome tufted. Fronds broadly rounded-cordate in outline, 2 to 4 in. long and broad, coriaceous, tripartite, the lateral divisions divaricate, all deeply pinnatifid, the lower segments again pinnatifid, the upper ones short and entire; lobes all obtusely lanceolate or ovate, with a black midrib sometimes shortly conspicuous, the veins otherwise oblique and forked concealed in the

substance of the frond. Sori continuous on the lobes.—Bedd. Ferns S. Ind. t. 37; F. Muell. Fragm. v. 124; *P. pedata*, R. Br. Prod. 155, not of Linn.; *P. Brownii*, Desv. in Mem. Soc. Linn. Par. vi. 294; *Pellaea geraniifolia*, Fée; Hook. Ic. Pl. t. 915, Spec. Filic. ii. 132, Syn. Filic. 146.

**Queensland.** Broad Sound, *R. Brown*; Rockingham Bay, *Dalley*; Port Denison, *Fitzalan*; Rockhampton, *O'Shanesy*, *Bowman*; Bowen, *Woolfs*.

**N. S. Wales.** New England, *C. Stuart*.

Widely dispersed over the tropical and subtropical regions of the New and the Old World.

2. *P. paradoxa*, *Baker*.—Rhizome creeping. Fronds 6 in. to 1½ ft. high, simply pinnate, the rachis dark and shining, glabrous or very rarely with a few scales. Pinnæ very few on young plants, often above 20 in luxuriant fronds, shortly petiolate, lanceolate or ovate-lanceolate, 1½ to 2½ in. long and usually broader than in *P. falcata*, coriaceous, with dichotomous free veins oblique on the midrib concealed in the substance of the frond. Sori usually continuous all round very nearly to the petiole. Indusium not so thin as in most species, soon concealed under the sori.—*Adiantum paradoxum*, B. Br. Prod. 155; Sieb. Fl. Mixt. n. 269; *Pellaea paradoxa*, Hook. Spec. Filic. ii. 135, t. 111, Syn. Filic. 152; *Platyloma Brownii*, J. Sm.; Bail. Queensl. Ferns, 36.

**Queensland.** Brisbane River. Moreton Bay, *A. Cunningham*, *F. Mueller* and others; Port Denison, *Fitzalan*.

**N. S. Wales.** Port Jackson, *R. Brown*; New England, *C. Stuart*; Richmond River, *C. Moore*, *Ramsay*; Tweed River, *Guilfoyle*.

Included by F. Mueller, Fragm. v. 123, under *P. falcata*, but although not generically separable it appears to me quite distinct as a species.

3. *P. falcata*, *R. Br. Prod.* 154.—Rhizome creeping. Fronds 6 in. to 1½ ft. long, simply pinnate, the rachis densely scaly-hirsute. Pinnæ numerous, sessile or nearly so, lanceolate, often falcate, 1 to 2 in. long, acute or rather obtuse, coriaceous with the concealed venation of *P. paradoxa*, the lower ones rarely auriculate at the base on the upper side. Sori continuous all round except the truncate base.—Hook. f. Fl. Tasm. ii. 139; Sieb. Syn. Filic. n. 109, Fl. Mixt. n. 253; F. Muell. Fragm. v. 123, partly; *Pellaea falcata*, Fée; Hook. Spec. Filic. ii. 135, t. 111, Syn. Filic. 151; *P. seticaulis*, Hook. Ic. Pl. t. 207; *Platyloma falcatum*, J. Sm.; Bedd. Ferns S. Ind. t. 22.

**Queensland.** Brisbane River. Moreton Bay, *A. Cunningham*; Port Denison, *Fitzalan*; Rockhampton and neighbouring districts, *B. Brown*, *O'Shanesy* and others.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *A. Cunningham* and others; northward to New England, *C. Stuart*; Hastings River, *Becker*; Tweed River, *Guilfoyle*; southward to Illawarra, *J. Brown*; Twofold Bay, *F. Mueller*; Lord Howe's Island, *C. Moore*, *Fullagar*.

**Victoria.** From Melbourne and the Grampians to East Gipps' Land, *F. Mueller* and many others.

**Tasmania.** Kent's Island, *R. Brown*; common in forests, etc., *J. D. Hooker*.

Also in East India, the Malayan Archipelago and New Zealand.



4. *P. rotundifolia*, Forst.; Hook. Ic. Pl. t. 422.—Habit of *P. falcata* but usually smaller or more slender. Pinnae orbicular or very broadly oblong, obtuse, often slightly cordate at the base, almost sessile, usually about  $\frac{1}{2}$  in. long or when luxuriant  $\frac{3}{4}$  in. Venation and scaly hirsute rachis entirely as in *P. falcata*.—*Pellaea rotundifolia*, Hook. Spec. Filic. ii. 136, Syn. Filic. 151; *Platyloma rotundifolium*, J. Sm.; Bail. Queensl. Ferns, 36.

Queensland. Mount Dryander, Fitzalan, also Mount Lindsey, Bailey (whose specimens I have not seen).

Also in New Zealand and in Norfolk Island. The figure in Hooker's Filic. Exot. t. 48, represents a luxuriant large form probably from a cultivated specimen.

5. *P. longifolia*, Linn.; Hook. Spec. Filic. ii. 157, Syn. Filic. 153.—Rhizome short and thick. Fronds 1 to 2 ft. high, simply pinnate, the stipes scaly-hairy at the base only. Pinnae usually numerous, sessile or nearly so, linear or linear-lanceolate, 3 to 6 in. long in full-grown specimens, the simple or forked veins transverse from the midrib and apparent. Sori continuous along the whole margin except the small rounded or cordate base.—F. Muell. Fragm. v. 126; Bedd. Ferns S. Ind. t. 33.

Queensland. Brisbane River, Moreton Bay, F. Mueller; Rockhampton, Bowman, Thozet, O'Shanesy.

N. S. Wales. Blue Mountains, Mrs. Culvert; New England, C. Stuart; Shoalhaven, C. Moore.

Victoria. Mitchell and Buchan Rivers, Gipps' Land, F. Mueller.

Widely spread over the tropical and temperate regions of the globe.

6. *P. ensiformis*, Burm. Fl. Ind. 230, Thes. Zeyl. t. 87.—Rhizome creeping. Fronds 9 to 16 in. high, pinnate, the stipes without scales. Pinnae when fertile usually linear, entire or the lower ones or nearly all lobed or again pinnate at the base, the terminal lobe often 2 to 4 in. long, the lateral ones short, often shortly decurrent; lobes of the barren fronds or pinnae oblong or ovate and denticulate; veins forked, transverse from the midrib. Sori continuous round the fertile lobes.—Hook. and Bak. Syn. Filic. 155; *P. crenata*, Swartz; Hook. Spec. Filic. ii. 163, t. 127; R. Br. Prod. 154; F. Muell. Fragm. v. 125.

Queensland. Endeavour River, Banks and Schimper; York Peninsula, N. Taylor; Port Denison, Fitzalan.

Ranges over tropical and Eastern Asia and the Pacific Islands.

7. *P. umbrosa*, R. Br. Prod. 154.—Rhizome thick and knotted or shortly creeping. Fronds attaining 2 or 3 ft., pinnate, the stipes often slightly scabrous. Pinnae 13 to 21, linear-lanceolate, 4 to 6 in. long, entire or the lower ones again divided into 3 to 5 similar segments, all more or less decurrent on the rachis, usually broader and minutely serrulate when barren, and the barren ends of fertile ones often deeply serrate; veinlets transverse, mostly forked. Sori continued down the decurrent base.—Hook. Spec. Filic. ii. 162, t. 130, Syn. Filic. 155; F. Muell. Fragm. v. 126; Sieb. Syn. Filic. n. 128.

**Queensland.** Brisbane River, Moreton Bay, *F. Mueller*; Dalrymple Creek, *Hartmann*.

**N. S. Wales.** Grose River, *R. Brown*; Blue Mountains, *Mrs. Calvert*; New England, *C. Stuart*; Hastings, Clarence and Macleay Rivers, *Becker*; Tweed River, *Guilfoyle*; southward to Illawarra, *A. Cunningham*; Twofold Bay, *F. Mueller*.

**Victoria.** Genoa River, *F. Mueller*.

**S. P. quadriaurita**, *Retz*; *Hook. Spec. Filic.* ii. 179, t. 134, *Syn. Filic.* 158.—Rhizome thick. Fronds pinnate, varying from 1 to 3 ft. long. Pinnae mostly opposite, 1 to 8 in. long, regularly and deeply pinnatifid, otherwise undivided or the lower ones with one or two similar secondary pinnae on the lower side. Pinnules or segments numerous, broadly linear, often falcate, obtuse, 1 to 8 lines long, confluent at the base, the pinnae usually ending in a long linear-lanceolate point lobed at the base. Sori often not reaching the base of the segments.—*Beld. Ferns S. Ind.* t. 31; *F. Muell. Fragm.* v. 125.

**Queensland.** Cape York Peninsula, *Hahn's Expedition*, *N. Taylor*; Rockingham Bay, *W. Hill, Dallachy*; Daintree River, *Fitzalan*.

Widely spread over the tropical regions of the New and the Old World.

**P. tremula**, *R. Br. Prod.* 154.—Rhizome not seen. Fronds 1 to 5 (usually 2 to 4) ft. high, glabrous, twice to four times pinnate, not so broadly expanded and the divisions more regular than in *P. aquilina*, the pinnae mostly opposite. Ultimate segments linear, rather firm when in fruit,  $\frac{1}{4}$  to 1 in. long, slightly decurrent, membranous flat and serrulate when barren; veins mostly forked and transverse. Sori usually continuous but scarcely reaching the base of the segments and sometimes interrupted, at length expanded so as to conceal the indusium.—*Hook. Spec. Filic.* ii. 174, t. 120; *Syn. Filic.* 161; *Hook. f. Fl. Tasm.* ii. 140; *Sieb. Syn. Filic.* n. 130.

**Queensland.** York Peninsula, *N. Taylor*; Rockingham Bay, *Dallachy*; Mount Elliott, *Fitzalan*; Rockhampton and neighbouring districts, *Burman, Thozet, O'Shanassy* and others.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown, Woolls* and others; New England, *C. Stuart*; Hastings River, *Becker*; Richmond River, *Mrs. H. J. Jones*; Tweed River, *Guilfoyle*; Lord Howe's Island, *Melne, McCallister* and others.

**Victoria.** Wannon River, *Robertson*; Cape Otway Ranges and Gipps' Land, *F. Mueller*.

**Tasmania.** Common in shady places, forests, etc., *J. D. Hooker*.

Also in Norfolk and Fiji Islands and New Zealand, and closely allied to the European *P. arguta*, *Ait.* with which it is united by *F. Mueller, Fragm.* v. 126.

**10. P. aquilina**, *Linn. var. esculenta*; *Hook. Spec. Filic.* ii. 197, *Syn. Filic.* 163.—Rhizome thick and creeping. Fronds from 1 or 2 to 8 or 10 ft. high, usually thrice pinnate. Primary pinnae distant, the lowest pair much larger and more compound, the upper gradually decreasing, giving the whole frond a triangular outline 2 to 4 ft. broad. Secondary or tertiary pinnae numerous, lanceolate, deeply pinnatifid or pinnate, always ending in a linear undivided obtuse segment, the lateral segments oblong or linear, scarcely widened at the base but decurrent

on the rachis, the midrib usually raised dilated and hardened with acute ciliate edges and the under surface usually hairy between the midrib and the sori. Sori continuous along the margin, the rather broad indusium really marginal, but the frond thickened and often minutely crenulate at the base of the indusium make it appear intramarginal.—Kunze in Pl. Preiss. ii. 111; Hook. f. Fl. Tasm. ii. 139; F. Muell. Fragm. v. 126; Sieb. Syn. Filic. n. 127; *P. esculenta*, Forst.; Labill. Pl. Nov. Holl. ii. 95, t. 244; R. Br. Prod. 154.

**Queensland.** Rockingham and Edgcombe Bays, *Dallwitz*; Daintree River, *Fildes*; Rockhampton and neighbourhood, *Barnard*, *O'Shanes*, *Thevet*; Brisbane, *Henne*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *A. Cunningham* and others; New England, *C. Stuart*; Hastings River, *Beckler*; Richmond River, *Mrs. Hodgkinson*; Illawarra, *Johnson*; Lord Howe's Island, *Fullagar*.

**Victoria.** Wendu Vale, *Robinson*; Melbourne, Dandenong Ranges, etc., *F. Mueller* and others; Grampians, *Sullivan*.

**Tasmania.** Derwent River, *R. Brown*; abundant throughout the island, *J. D. Hooker*.

**S. Australia.** St. Vincent's Gulf, *F. Mueller*; Kangaroo Island, *Waterhouse*.

**W. Australia.** King George's Sound to Swan River, *Drummond*, n. 399, *Preiss*, n. 1300 and others.

The species is generally abundant in some form or other in most tropical and temperate regions of the globe, the var. *esculenta* only in the southern hemisphere. A few Australian specimens (Portland, *Robertson*, Flinders Bay, *Cassin*, etc.) come very near to the typical form with small contiguous segments dilated at the base, pubescent underneath with a scarcely prominent midrib and with much less marginal thickening at the base of the indusium.

11. ***P. incisa*, Thunb.; Hook. Spec. Filic. ii. 230, Syn. Filic. 172.**—Rhizome creeping. Fronds varying from 1 to 5 ft. high, glabrous, twice or thrice pinnate. Pinnules of the barren fronds usually deeply pinnatifid, 1 to 2 in. long, with broad obtuse membranous lobes, the veins proceeding from the midrib of the pinnule repeatedly forked in each lobe, the branches here and there anastomosing or all free. In the fertile fronds the secondary pinnæ often pinnate at the base, pinnatifid in the upper part, the lower pinnules or segments with a distinct midrib and variously branched veins, the upper lobes less regularly veined. Sori continuous or interrupted, often neither reaching the base nor the apex of the segment.—Hook. f. Fl. Tasm. ii. 140; Sieb. Fl. Mixt. n. 252; F. Muell. Fragm. v. 124; *P. vespertilionis*, Labill. Pl. Nov. Holl. ii. 96, t. 245; R. Br. Prod. 154; *Lilobrochia vespertilionis*, Presl; Bail. Queensl. Ferns, 26.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *A. Cunningham* and others; Clarence River, *Beckler*; Richmond River, *Mrs. Hodgkinson*; Illawarra, *Johnson*; Lord Howe's Island, *C. Moore*, *Fullagar*.

**Victoria.** Mount Disappointment, Dandenong Ranges, *F. Mueller*; Grampians, *Sullivan*; Upper Yarra River, *Walter*.

**Tasmania.** Derwent River and King's Island, *R. Brown*; common in damp woods ascending to 3000 ft., *J. D. Hooker*.

**S. Australia.** Penola, *Woods*.

Spread over the tropical and southern extratropical regions of the New and the Old World.







12. ***P. marginata***, Bory; Hook. and Bak. Syn. Filic. 172.—Rhizome not seen. Fronds on young plants sometimes under 1 ft., when full grown several feet high, the main rhachis branched, usually tripartite, each branch pinnate. Pinnæ numerous, 3 to 10 in. long, deeply pinnatifid; segments oblong or broadly linear, often falcate, obtuse,  $\frac{1}{4}$  to 1 in. long, confluent into a winged rhachis 2 to 3 lines broad; veins copiously reticulate on each side of the midrib. Sori often continued round the sinus, but rarely reaching the ends of the lobes. Barren fronds thinner, the lobes often minutely dentate.—*P. tripartita*, Swartz; Hook. Spec. Filic. ii. 225, t. 138; F. Muell. Fragm. v. 125; *P. Milneana*, Baker, Syn. Filic. 170; *Litobrochia tripartita*, Presl, and *L. Milneana*, Bail. Queensl. Ferns, 26.

Queensland. Rockingham Bay, *Dallachy*; Bellenden Ker Range, *W. Hill*; Daintree River, *Fitzalan*; Bowen, *Woolfs*.

Ranges over tropical Asia and Africa and the Pacific Islands.

*P. Felicennæ*, F. Muell. Fragm. v. 124, from Rockingham Bay, is evidently a small frond of this species, probably from a young root. We have similar specimens from various stations.

13. ***P. comans***, Forst.; Hook. Spec. Filic. ii. 219, Syn. Filic. 171.—Near *P. marginata*, but larger and more branched, the main rhachis bearing several branches or primary pinnæ of 1 to 2 ft. or more. Secondary pinnæ 4 to 10 in. long, deeply pinnatifid; segments numerous,  $\frac{1}{2}$  to 2 in. long, oblong-lanceolate or linear, often falcate, decurrent along the rhachis which is not however uniformly winged as in *P. marginata*; some of the lower segments sometimes again shortly pinnatifid; veins copiously reticulate. Sori usually continued round the sinus but rarely to the tips of the lobes. Barren segments or barren tips of the fertile ones usually dentate.—F. Muell. Fragm. v. 125; *P. Endlicheriana*, Agardh; Hook. Ic. Pl. t. 973, Spec. Filic. ii. 218; Hook. f. Fl. Tasm. ii. 141; *P. microptera* Metten.; Kuhn in Linnæa, xxxvi. 92.

Queensland. Toowamba, *Hartmann*.

N. S. Wales. Blue Mountains, *Woolfs*; Lord Howe's Island, *C. Moore*.

Victoria. Johanna River, *F. Mueller*; Dandenong, *L. Morton*; Apollo Bay, *Wilkinson*.

Tasmania. Circular Head, *Gunn*, *Emmett*, *F. Mueller*.

Also in New Zealand and the Pacific Islands.

## 26. LOMARIA, Willd.

(*Stegania*, R. Br.)

Rhizome creeping or ascending into a short trunk. Fronds pinnatifid or simply pinnate, rarely undivided, the outer ones of each year's shoot barren with flat pinnules, the inner ones with linear fertile pinnules or rarely a few lower barren ones. Sori in a continuous line on each side of the midrib between it and the margin, with a membranous indusium attached close to the margin and opening on the inner side next the

midrib, the sori at length covering almost the whole of the under surface. Veins of the barren pinnules transverse or oblique on the midrib, mostly forked.

The genus is generally distributed over the tropical and temperate regions of the globe. Of the ten Australian species three are common to the New and the Old World, three are limited to the Old World and chiefly Asiatic, one is only in New Zealand and the South Pacific Islands, three appear to be endemic.

- |   |                            |
|---|----------------------------|
| Fronds simple or with few long segments decurrent on the stipes . . . . .   | 1. <i>L. Patersoni</i> .   |
| Barren fronds with numerous segments attached to the rhachis by a broad base, the upper ones confluent.                                   |                            |
| Lowest segments as long as the others or nearly so . . . .  | 2. <i>L. vulcanica</i> .   |
| Lower segments gradually smaller and more distant.  |                            |
| Rhachis and stipes glabrous except at the very base.  |                            |
| Barren segments narrow, 1 to 4 in. long, fertile ones nearly as long. Rhachis dark . . . . .  | 3. <i>L. discolor</i> .    |
| Barren segments broadly lanceolate, 1 to 1½ in. long; fertile ones ½ to 1 in. Rhachis pale . . . . .                                      | 4. <i>L. lanceolata</i> .  |
| Barren segments lanceolate acuminate 1 to 1½ in. fertile ones above 2 in. subulate. Rhizome with copious linear subulate scales . . . . . | 5. <i>L. attenuata</i> .   |
| Barren segments ovate-oblong, rarely ½ in. long, fertile ones 2 to 5 lines long . . . . .   | 6. <i>L. alpina</i> .      |
| Rhachis and stipes scaly or hispid.   |                            |
| Barren segments ½ to 1 in. long, 3 to 4 lines broad, the margins and veins glabrous . . . . .   | 7. <i>L. fluriatilis</i> . |
| Barren segments 1½ to 2 in. long, ½ in. broad, the margins and veins ciliate . . . . .  | 8. <i>L. Fullageri</i> .   |
| Barren fronds with several or numerous pinnæ attached by the midrib only, the lowest rarely small.  |                            |
| Segments obliquely truncate at the base . . . . .   | 9. <i>L. capensis</i> .    |
| Segments tapering at the base . . . . .   | 10. <i>L. euphlebia</i> .  |

1. *L. Patersoni*, Spreng. ; Hook. Spec. Filic. iii. 3, Syn. Filic. 174. —Rhizome short and thick. Fronds from under 1 ft. to near 2 ft. long, undivided or pinnatifid with few (very rarely 9 or 11) linear segments of 3 to 6 in., more or less decurrent on the rhachis and short stipes, those of the barren fronds ½ to 1 in. broad, the veins transverse; segments of the fertile fronds as long but only 1 to 2 lines broad, the sori at length covering the whole under surface. Occasionally the lower portion of the frond broad and barren and the upper segments wholly or partially narrow and fertile.—Hook. Filic. Exot. t. 49; Hook. f. Fl. Tasm. ii. 141; F. Muell. Fragm. v. 122; *Stegania Patersoni*, R. Br. Prod. 152; *Lomaria elongata*, Blume; Hook. Spec. Filic. iii. 3, t. 143.

**Queensland.** Rockingham Bay, *Dallachy*; Mount Lindsay, *W. Hill*; southern districts, *Hartmann*.

**N. S. Wales.** Port Jackson, *Wool's*; New England, *C. Stuart*; Macleay River, *Herist*; Clarence River, *Wilson*; Tweed River, *Gulfside*; Twofold Bay, *F. Mueller*.

**Victoria.** Sealer's Cove, Bunip and Hume Rivers, *F. Mueller*; Apollo Bay, *Walter*.

**Tasmania.** Port Dalrymple, *R. Brown*; N. E. of Launceston, *Gunn*.

Dispersed over East India, the Malayan Archipelago, the south Pacific Islands and New Zealand. From almost all the Australian localities there are specimens with undivided and with pinnatifid fronds, and sometimes the two from the same rhizome.

**2. *L. vulcanica*, Blume; Hook. Spec. Filic. iii. 12, Ic. Pl. t. 969, Syn. Filic. 176.**—Rhizome thick or shortly creeping, covered with shining black hairlike scales. Fronds under 1 ft. high, glabrous, deeply pinnatifid with numerous segments; those of the barren fronds lanceolate, falcate, confluent by their broad base, the lower ones 1 to 2 in. long, 3 to 6 lines broad, the lowest pair scarcely smaller and sometimes reflexed, the upper segments gradually diminished to short lobes. Segments of the fertile fronds nearly as long, under 2 lines broad except the dilated adnate base.—Hook. f. Pl. Tasm. ii. 143.

**Queensland?** A specimen with barren fronds only from York Peninsula, *N. Taylor*, appears to be this plant.

**Tasmania.** Franklin River and other mountainous parts of the colony, *J. D. Hooker*; Mount Lapegrouse, *C. Stuart*.

Also in New Zealand, Java and the South Pacific Islands.

**3. *L. discolor*, Willd.; Hook. Spec. Filic. iii. 5, Syn. Filic. 175.**—Rhizome thick, ascending into a short trunk. Fronds 1 to 2 ft. or sometimes longer, pinnate or deeply pinnatifid, the rachis and stipes glabrous and shining black, with scales only at the base of the stipes. Larger pinnules of the barren fronds  $1\frac{1}{2}$  to 3 or even 4 in. long, broadly linear or narrow-lanceolate, mostly connected by their dilated base, usually of a thicker texture and the veins less conspicuous than in *L. lanceolata*, the lower ones gradually smaller and more distinct. Pinnules of the fertile fronds very numerous, 1 to 4 in. long,  $1\frac{1}{2}$  to 2 lines broad.—Hook. f. Pl. Tasm. ii. 143; F. Muell. Fragm. v. 121; Sieb. Fl. Mixt. n. 245; *Stegania nuda* and *S. falcata*, R. Br. Prod. 153; *Onoclea nuda*, Labill. Pl. Nov. Holl. ii. 96, t. 246.

**Queensland.** Rockingham Bay, *Dallachy*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *A. Cunningham*, *Wells*; Hastings River, *C. Moore*; Illawarra, *A. Cunningham* and others; Twofold Bay, *F. Mueller*.

**Victoria.** From Dandenong to E. Gipps' Land, *F. Mueller* and others.

**Tasmania.** Port Dairymple, *R. Brown*; abundant in damp forests, etc., *J. D. Hooker* and others.

**S. Australia.** Lofty Ranges, *F. Mueller*.

Also in New Zealand and Norfolk Island. Barren specimens occur sometimes with the larger pinnules pinnatifid above the middle.

**4. *L. lanceolata*, Spreng.; Hook. Spec. Filic. iii. 11, Ic. Pl. t. 429, Syn. Filic. 177.**—Rhizome thick, sometimes rising into a trunk of  $\frac{1}{2}$  ft. or more. Fronds 6 in. to above 1 ft. long, deeply pinnatifid or pinnate, the rachis glabrous, usually pale coloured or green. Segments of the barren fronds oblong or lanceolate, dilated at the base, contiguous and often confluent, the longer ones  $\frac{3}{4}$  to near 2 in. long and 4 to 6



lines broad, the lower gradually smaller, the lowest very short and broad. Segments of the fertile fronds under 1 in. long, about  $1\frac{1}{2}$  lines broad.—Hook. f. Fl. Tasm. ii. 143; F. Muell. Fragm. v. 121; *Stegania lanceolata*, R. Br. Prod. 152.

**Victoria.** Hopkins River, *Allen*, and thence to Wilson's Promontory sparingly in shaded woods, *F. Mueller*.

**Tasmania.** *R. Brown*; abundant in subalpine moist forests, *J. D. Hooker*.

**S. Australia.** Mount Gambier, *F. Mueller*.

Also in New Zealand and the Pacific Islands.

5. **L. attenuata**, *Willd.*; *Hook. Spec. Filic.* iii. 6, *Syn. Filic.* 176.—Rhizome thick, creeping up the stems of fern trees, densely covered with long almost hairlike brown scales. Fronds 1 to  $1\frac{1}{2}$  ft. long, deeply pinnatifid, almost pinnate from near the base. Segments of the barren ones lanceolate-falcate, 1 to 2 in. long in the centre of the frond, the lower ones gradually smaller, the lowest very short and broad, all attached by their broad base and mostly confluent, the rachis glabrous or slightly scaly. Veins oblique from the midrib, once forked. Segments of the fertile fronds very narrow linear, 2 to 4 in. long.

**N. S. Wales.** Lord Howe's Island, on the stems of tree ferns, *C. Moore*, *Fallagar*, *Fitzgerald*.

Ranges over tropical America, southern Africa, the Mascarene and Pacific Islands.

6. **L. alpina**, *Spreng.*; *Hook. Spec. Filic.* iii. 16; *Filic. Exot. t.* 32, *Syn. Filic.* 178.—Rhizome creeping, scaly. Fronds deeply pinnatifid or pinnate, 3 to 8 in. long, the rachis and slender stipes glabrous. Pinnules or segments of the barren fronds oblong, obtuse, attached by their broad base, the larger ones scarcely  $\frac{1}{2}$  in. long,  $\frac{1}{4}$  in. broad and usually distinct, the upper ones smaller and confluent, the lower gradually smaller, short, broad, sometimes distant. Fertile fronds often much longer than the barren ones, the segments 2 to 5 lines long, 1 to  $1\frac{1}{2}$  lines broad.—Hook. f. Fl. Tasm. ii. 144; F. Muell. Fragm. v. 121; *Stegania alpina*, R. Br. Prod. 152.

**N. S. Wales?** Macleay River, *C. Moore*, two barren fronds appear to belong to this species.

**Victoria.** Upper Hume River, Mount Useful and other Alps, abundant, *F. Mueller*.

**Tasmania.** Table Mountain (Mount Wellington) *R. Brown*; abundant in boggy places and tops of all the mountains, *J. D. Hooker*; Southport, in plains near the sea, *C. Stuart*.

Also in extratropical South America and New Zealand.

7. **L. fluviatilis**, *Spreng.*; *Hook. Spec. Filic.* iii. 34, *Syn. Filic.* 181.—Rhizome short, thick, scaly. Fronds 6 in. to above 1 ft. long, pinnate. Pinnules or segments of the barren ones oblong, rounded at the end, attached by their broad base, the larger ones  $\frac{1}{2}$  to near 1 in. long, 3 to 4 lines broad, all distinct, the upper ones smaller and confluent, the lower gradually smaller and more distant, the rachis more or less scaly. Segments of the fertile fronds 6 to 8 lines long,



1 to  $1\frac{1}{2}$  lines broad.—Hook. f. Fl. Tasm. ii. 142, t. 167; F. Muell. Fragm. v. 121; *Stegania fluviatilis*, R. Br. Prod. 152.

**Victoria.** Deep shaded valleys, Delatite, Mitta-Mitta, Bawbaw, etc., in Gipps' Land, ascending to 5000 ft., *F. Muell.*

**Tasmania.** Derwent River, *R. Brown*; covering shaded precipices near the Acheron River, *Gunn*; shady creeks, Southport, *C. Stuart*.

Also in New Zealand.

8. **L. Fullageri**, *F. Muell. Fragm.* viii. 157.—Rhizome lengthening into a trunk of 1 to 2 ft. and with the remains of old fronds 2 to 4 in. thick. Fronds mostly about 1 ft. long, pinnate. Segments of the barren ones oblong-lanceolate, obtuse, obtusely auriculate at the base on each side, the larger ones  $1\frac{1}{2}$  to 2 in. long and  $\frac{1}{2}$  in. broad, the upper ones shorter and confluent, the lower smaller distant and more auriculate, all attached by their broad base, the margins and forked veinlets ciliate, the rhachis densely ferruginous-hispid. Segments of the fertile fronds 1 to 2 in. long, scarcely 1 line broad.—*L. auriculata*, Bak. Syn. Filic. 481.

**N. S. Wales.** Lord Howe's Island, *C. Moore*, *Fullagar*, *Fitzgerald*. Baker's name and diagnosis were printed off early in 1873, though not actually published till 1874, at about the same time as *F. Mueller's*.

9. **L. capensis**, *Willd.*; *F. Muell. Fragm.* v. 121.—Rhizome thick and scaly, short or ascending to a short trunk. Fronds pinnate, the segments of the barren ones broadly lanceolate, very oblique at the base and attached only by the midrib, the lowest pairs not much smaller or very rarely one small pair lower down, otherwise very variable, the frond sometimes 3 to 4 ft. long with numerous rigid pinnae 3 to 6 in. long and 1 in. broad, and from that to a whole frond of 6 in. with membranous pinnae of  $\frac{1}{2}$  to 1 in., the rhachis slightly scaly or glabrous. Fertile fronds equally variable, the narrow linear pinnae in some specimens under 1 in. in others above 6 in. long.—*L. procera*, Spreng.; Hook. Spec. Filic. iii. 22, Syn. Filic. 179, Ic. Pl. t. 427, Gard. Ferns, t. 53; Hook. f. Fl. Tasm. ii. 142; *Blechnum procerum*, Labill. Pl. Nov. Holl. ii. 97, t. 247; *Stegania minor* and *S. procera*, R. Br. Prod. 153.

**Queensland.** Rockingham Bay, *Dallachy*; Mount Lindsay, *W. Hill*; Bowen, *Woolfs*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *A. Cunningham*, *Woolfs* and others; New England, *C. Stuart*; Clarence River, *Beckler*, *Wilcox*; Tweed River, *Guilfoyle*; Lord Howe's Island, *C. Moore*.

**Victoria.** From Melbourne and the Grampians to East Gipps' Land, *F. Mueller* and others.

**Tasmania.** Port Dalrymple and King's Island, *R. Brown*; abundant in wet shady places throughout the island, *J. D. Hooker*.

**S. Australia.** Mount Lofty Ranges, *F. Mueller*.

The species is dispersed over tropical and southern extratropical America, the Malayan Archipelago, the south Pacific Islands and New Zealand.

10. ***L. euphlebia***, Kunze; *Hook. Spec. Filic.* iii. 20, *Syn. Filic.* 183.—Rhizome thick and woody, slightly scaly, ascending to 1 ft. or more. Fronds pinnate, often above 2 ft. long. Pinnæ distant, lanceolate, 3 to 8 in. long,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. broad, contracted at the base and sometimes tapering to a short petiole, the uppermost one rarely sessile or slightly decurrent, the lowest not much smaller, the rachis glabrous. Pinnæ of the fertile fronds narrow linear, 3 to 6 in. long.—*L. articulata*, F. Muell. *Fragm.* v. 187.

**Queensland.** Rockingham Bay, *Dallachy*.

Spread over East India, China and Japan. *Dallachy*'s specimens exactly correspond with the typical form figured by Kunze, *Farrenkr.* t. 125. *Hooker*'s figure 2nd Cent. Ferns, t. 89, represents an abnormal Japanese and Chinese variety with the pinnæ from the middle upwards adnate by a broad base. I cannot perceive the obliquity of the ring of the spore-cases which has induced some pteridologists to place the species in a different genus.

## 27. BLECHNUM, Linn.

Rhizome short and thick or slightly elongated and horizontal. Fronds deeply pinnatifid or pinnate or in species not Australian simple or bipinnate, the segments narrow. Sori in a continuous line on each side of the midrib, with a membranous indusium opening from under the midrib outwards, the two sori often at length confluent concealing the midrib.

The genus consists of but few species dispersed over the tropical and sub-tropical regions of the globe. Of the four Australian species two have a wide range, one of them chiefly in America but also in Asia, the other only in the Old World, the remaining two species appear to be endemic.

- |  |                              |
|--|------------------------------|
| Segments with a dilated adnate base, the upper ones confluent . . . . .  | 1. <i>B. cartilagineum</i> . |
| Segments or pinnæ attached by the midrib only or rarely a few of the uppermost adnate.   |                              |
| Segments obliquely truncate at the base. Barren fronds with much broader and shorter segments than the fertile. Veins not very close . . . . . | 2. <i>B. levigatum</i> .     |
| Segments smooth and shining with very numerous fine parallel veins.  |                              |
| Segments serrulate, obliquely truncate at the base . . . . .   | 3. <i>B. serrulatum</i> .    |
| Segments with entire margins, mostly narrowed at the base . . . . .  | 4. <i>B. orientale</i> .     |

1. ***B. cartilagineum***, Swartz; *Hook. Spec. Filic.* iii. 43, *Syn. Filic.* 184.—Rhizome short thick and woody, usually covered with shining black scales. Fronds 1 to 2 ft. long, the stipes usually scabrous. Segments numerous, 3 to 6 in. long, almost coriaceous, serrulate, distinctly veined, dilated and adnate at the base, the upper smaller ones confluent, the lower ones sometimes distant.—*Metten*.





Filic. Hort. Lips. t. 5: R. Br. Prod. 152; F. Muell. Fragm. v. 120 Sieb. Syn. Filic. n. 123; *B. striatum*, Sond. and Muell. in Linnæa, xxv. 717, not of Swartz.

**Queensland.** Rockingham Bay, *Dallachy*; Port Denison and Daintree River, *Fitzalan*; Rockhampton, *O'Shannassy*; various localities in South Queensland, *Leichhardt*, *Hartmann* and others.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *A. Cunningham* and others; New England, *C. Stuart*; Hastings River, *Beckler*; Richmond River, *Henderson*; Tweed River, *Gurlyong*; Illawarra, *Johnson*; Twofold Bay, *F. Mueller*.

**Victoria.** Dandenong Ranges, Sealer's Cove, Gipps' Land, etc., *F. Mueller* and others.

*B. nitidum*, Presl, at least as to the Australian plant referred to it in Bail. Queensl. Ferns, 15, appears to be only a slight variety of *B. cartilagineum*, with a smoother stipes and rhachis.

2. *B. lævigatum*, *Cur.*; *Hook. Spec. Filic.* iii. 55, t. 160, *Syn. Filic.* 186.—Rhizome thick and horizontal, very scaly. Fronds 1 to 2 ft. long. Pinnæ all distinct, obliquely truncate at the base, attached by the midrib only, in some fronds all barren,  $1\frac{1}{2}$  to 6 in. long,  $\frac{1}{2}$  to 1 in. broad, entire or serrulate; in other fronds all fertile, 2 to 5 in. long, 2 lines broad, the sori occupying almost the whole under surface; in other fronds again 4 to 6 in. long, 4 to 6 lines broad, with the sori next the midrib as in *B. cartilagineum*, but not adnate to the rhachis. R. Br. Prod. 152; F. Muell. Fragm. v. 120; *B. ambiguum*, Kaulf. in Sieb. Syn. Filic. n. 106.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *Clares*, *Woolfs*.

3. *B. serrulatum*, *Rich.*; *Hook. Spec. Filic.* iii. 54, *Syn. Filic.* 186.—Rhizome short and thick or longer and creeping. Fronds 1 to 2 ft. long. Pinnæ distinct, linear or lanceolate, mostly 2 to 4 lines long and nearly 3 lines broad or 4 lines when barren, obliquely truncate at the base but attached by the midrib only, serrulate, smooth and shining, the veins oblique very numerous and fine, mostly forked. Sori close to the midrib, the indusium soon concealed under them.—*B. striatum*, R. Br. Prod. 152; *Hook. Spec. Filic.* iii. 55, t. 159; Sieb. Syn. Filic. n. 125, Fl. Mixt. n. 242; F. Muell. Fragm. v. 120.

**N. Australia.** Providence Hill and M'Adam Range, *F. Mueller*; Port Darwin, *Schultz*, n. 487; Port Essington, *Armstrong*.

**Queensland.** Cape York, *Daniel*; Rockingham Bay, *Dallachy*; Rockhampton, *Thozet*; Mereton Bay, *C. Stuart*.

**N. S. Wales.** Port Jackson, *R. Brown*, *A. Cunningham*; Richmond River, *Mrs. Hodgkinson*.

Dispersed over tropical America, the Malayan Archipelago and New Caledonia.

4. *B. orientale*, *Linn.*; *Hook. Spec. Filic.* iii. 52, *Syn. Filic.* 186,  
3 B 2



*Filic. Exot. t. 77*.—Rhizome thick rising to a short erect trunk. Fronds 2 to 3 ft. long. Pinnæ distinct, 6 in. 1 ft. long,  $\frac{1}{2}$  to 1 in. broad near the base, tapering to a long point, mostly cuneate at the base and attached by the midrib only, the numerous veins very fine as in *B. serrulatum*, but the margins quite entire. Sori close to the midrib and soon covering it. A few of the uppermost pinnæ occasionally adnate and decurrent on the rhachis.—F. Muell. *Fragm. v. 120*; Bedd. *Ferns S. Ind. t. 29*.

**N. Australia.** Adelaide River, *M'Douall Stuart*,  
**Queensland.** Rockingham Bay, *Dallachy*; Islands off the Coast, *Leeke, Walter*; Daintree River, *Fitzalan*; Gilbert River, *Daintree*.

Also in East tropical Asia and in the South Pacific Islands.

## 28. MONOGRAMME, Schkuhr.

Rhizome slender, creeping. Fronds simple, narrow, veinless except the midrib. Sori in a single continuous line in the upper part of the frond, in a groove opening along the midrib, the margins of the groove forming an indusium along one or both sides of the sorus.

A small genus spread over the tropical and southern extratropical regions of the New and the Old World. The only Australian species extends over the area of the genus at least in the Old World.

1. **M. Junghuhnii**, *Hook. Spec. Filic. v. 123, Syn. Filic. 375, var. tenella*.—Rhizome almost filiform, intricately matted, covered with fine hairlike scales. Fronds slender and grass-like, 1 to 2 $\frac{1}{2}$  in. high, entire, scarcely  $\frac{1}{4}$  line broad, flat with a prominent midrib in the lower barren part, the upper fertile half rather broader.—Bedd. *Ferns S. Ind. t. 210*; F. Muell. *Fragm. vii. 110*; *Didymopteris angustissima*, Brackenr. *Filic. U. S. Expl. Exped. 135, t. 17*.

**Queensland.** Rockingham Bay, *Dallachy*. The numerous specimens in the collection are all quite similar to Ceylonese ones, as figured by Beddome. The typical form from the Malayan Archipelago and Pacific Islands, more specially described by Hooker, has very much longer and stouter fronds.

## 29. DOODIA, R. Br.

Rhizome tufted. Fronds simply pinnate or deeply pinnatifid. Sori oblong or shortly linear, on transverse veinlets connecting the forked veins proceeding from the midrib, in one or two rows parallel to the midrib on each side, with an indusium of the same shape, proceeding from the veinlet and opening on the inner side. Scabrous ferns, often small.











Besides the Australian species of which two are endemic and the third extends to New Zealand and the Pacific Islands, there is a fourth from Ceylon.

Pinnules or segments all adnate by their broad base.

Fronds rarely exceeding 1 ft., very scabrous. Sori ovate, in 1 or 2 rows between the midrib and the margin . . . . .

1. *D. aspera*.

Fronds mostly above 1 ft. long. Sori narrow-oblong in a row very near the midrib . . . . .

2. *D. blechnoides*.

Lower or nearly all the pinnules attached only by the midrib, or the lowest petiolate. Sori oblong . . . . .

3. *D. caudata*.

1. *D. aspera*, *R. Br. Prod.* 151.—Fronds erect, rigid, mostly about 1 ft. or less but varying from 6 to nearly 18 in., the pinnules as well as the rhachis exceedingly scabrous. Pinnules or segments numerous, all attached by their broad or dilated base, rigidly serrulate, those in the centre of the frond lanceolate falcate, 1 to 2 rarely nearly 3 in. long, the upper ones shorter and more confluent gradually reduced to the lanceolate point of the frond, the lower segments more distinct, gradually shorter, the lowest reduced to small wing-like appendages to the rhachis. Sori ovate or almost rounded, usually in one row on each side at a little distance from the midrib, but in the larger segments often numerous in at least two rows on each side.—Hook. *Spec. Filic.* iii. 71, *Syn. Filic.* 189, *Exot. Fl.* t. 8; *Sieb. Fl. Mixt.* n. 249; *F. Muell. Fragm.* v. 130; *Woodwardia aspera*, Metten.; *Bail. Queensl. Ferns*, 27.

**Queensland.** Brisbane and Burnett Rivers, *F. Mueller*; Mount Elliott, *Fitzalan*.

**N. S. Wales.** Hunter's River, *R. Brown*; Port Jackson to the Blue Mountains, *A. Cunningham*, *Fraser*, *Gaudichaud*; New England, *C. Stuart*; Richmond River, *C. Moore* and others; Hastings, Macleay and Clarence Rivers, *Bekler*; Tweed River, *Guilfoyle*; Illawara, *Johnson*; Twofold Bay, *F. Mueller*; Lord Howe's Island, *C. Moore*.

**Victoria.** Broadribb and Snowy Rivers, *F. Mueller*; Cape Howe, *Walter*.

2. *D. blechnoides*, *A. Cunn.*; *Hook. Spec. Filic.* iii. 72, *Syn. Filic.* 189.—A larger plant than *D. aspera*, and much less scabrous. Pinnæ similarly dilated and adnate at the base, but thinner with finer more numerous nerves connected in areoles near the midrib, parallel and simple between the sori and the margin. Sori transversely narrow-oblong, forming a regular row on each side of the midrib and very near it, with very rarely a few small ones outside the row. The whole frond 1 to 1½ ft. long, the larger pinnæ 3 to 4 in., a few at the base of the frond smaller and distant, but none of the short broad ones of *D. aspera*.—Metten. *Filic. Hort. Lips.* t. 6, f. 3.

**N. S. Wales.** Nepean River, *Fraser*, *A. Cunningham*; Cedar Creek, New England, *C. Stuart*.

3. *D. caudata*, *R. Br. Prod.* 151.—A smaller more slender plant

than *D. aspera*, the fronds often decumbent at the base, ascending in the typical form to 6 to 8 in., or rarely to 1 ft., scabrous but not so much so as in *D. aspera* and very variable. Lower pinnae distinct, short, ovate or ovate-lanceolate, often broadly biauriculate, attached by the midrib only and mostly barren; intermediate ones lanceolate falcate with a broad base, mostly fertile and attached by the midrib only, the upper ones more adnate, the uppermost short and confluent into a lanceolate or linear apex to the frond, but sometimes the whole frond consisting of short broad barren pinnae, or the narrow fertile ones continued nearly to the base, and in a few specimens the narrow almost entire apex occupying nearly the whole frond. Sori oblong, usually in a single row on each side of the midrib, and sometimes almost confluent.—Hook. Spec. Filic. iii. 75, Syn. Filic. 190, Exot. Fl. t. 25; Hook. f. Fl. Tasm. ii. 147; F. Muell. Fragm. v. 129; *D. rupestris*, Kaulf. in Sieb. Syn. Filic. n. 114, Fl. Mixt. n. 218; *Woodwardia caudata*, Cav.; Bail. Queensl. Ferns, 27.

**Queensland.** York Peninsula, *N. Taylor*; Rockingham Bay, *Dallachy*; Daintree River, *Fitzalan*; Rockhampton, Moreton Bay and other localities in S. Queensland, *Bowman*, *Dallachy*, *F. Mueller* and others.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *A. Cunningham* and others; New England, *C. Stuart*; Hastings River, *Reckler*; Clarence River, *Wileox*; Tweed River, *Guilfoyle*.

**Victoria.** Wannon River, *Robertson*; Dandenong Ranges and Gipps' Land, *F. Mueller*.

**Tasmania.** Port Dalrymple, *R. Brown*; abundant in dry stony situations as well as in shady places, *J. D. Hooker*.

Also in New Zealand and the South Pacific Islands.

**Var. media.** Fronds larger, often above 1 ft. long. Longer segments in the middle of the frond 1 to 2 in. long. I can find no other difference, and the intermediate sizes are numerous.—*D. media*, R. Br. Prod. 151; Hook. Spec. Filic. iii. 74, Syn. Filic. 190; *Woodwardia media*, Fée; Bail. Queensl. Ferns, 27.—Endavour River, *Banks and Solander*; sent from most of the same stations as the typical form, but more frequent in Queensland and the northern parts of N. S. Wales, whilst in Victoria and Tasmania the small form is the most common.

### 30. ASPLENIUM, Linn.

Rhizome creeping, or short and thick, or rising to a shortly arborescent trunk. Sori linear or rarely oblong, on veins proceeding from the midrib or the base of the pinnales or on their branches. Indusium linear or oblong, attached along one side to the vein and opening along the other side.

A large genus generally dispersed over the tropical and temperate regions of the globe. Of the 21 Australian species, 3 have a more or less general distribution over the New as well as the Old World, 9 are limited to the Old World, 4 extend to New Zealand, one of them also in the extreme south of America, the remaining 5 are endemic.







SECT. I. *Euasplenium*.—Sori linear, diverging from the midrib or from the petiole towards the margin the indusium opening from the inner or upper edge outwards.

Fronds entire. Veins and sori parallel and transverse.

Fronds coriaceous, 1 to 6 ft. long, 3 to 8 in. broad.

Veins closely parallel, connected within the margin . . . . .

Fronds thinner, 1 to 1½ ft. long; ¾ to 1¼ in. broad.

Veins mostly 1 line apart, not connected at the end . . . . .

Fronds linear-lanceolate, broken into segments only at the base. Veins very oblique, parallel . . . . .

Fronds simply pinnate.

Veins few, forked, pinnately diverging from an irregular midrib. Fronds small, tufted, pinnules 2 to 3 lines long . . . . .

Veins more or less tripartite or flabellate at the base of the pinnule, one branch usually elongated and penninerved.

Fronds weak, diffuse. Pinnules obliquely obovate or fan-shaped, 3 to 6 lines broad . . . . .

Fronds diffuse, scaly-hirsute. Pinnules ovate fan-shaped or broadly lanceolate, 6 to 9 lines long . . . . .

Fronds attaining 1 to 2 ft. Pinnules lanceolate, acuminate, 1½ to 5 in. long . . . . .

Veins numerous and parallel from the midrib. Pinnules oblong or lanceolate, coriaceous . . . . .

Fronds bipinnate. Segments cuneate, striate.

Fronds 3 to 6 in. long. Primary pinnae ½ to 1 in. long, with small distinct segments. Sori few, rather large . . . . .

Fronds 6 to 18 in. long. Primary pinnae lanceolate, 1½ to 2 in. long, with distinct or confluent toothed segments . . . . .

Fronds 2 to 3 ft. long, thrice or four times pinnate, with numerous primary and secondary pinnae. Sori small . . . . .

1. *A. nidus*.

2. *A. simplicifrons*.

3. *A. attenuatum*

4. *A. trichomanes*.

5. *A. flabellifolium*.

6. *A. paleaceum*.

7. *A. falcatum*.

8. *A. obtusatum*.

9. *A. Hookerianum*.

10. *A. furcatum*.

11. *A. laserpitii obium*.

SECT. II. *Darea*.—Sori oblong or linear on a vein parallel to the margin of the teeth or lobes and opening towards the margin.

Sori large with prominent indusia, one to each tooth or lobe of the pinnules.

Fronds 1 to 2 ft. long, mostly bipinnate; pinnules lanceolate, ½ to 1 in. long . . . . .

Fronds mostly pinnate; pinnules very narrow, 3 to 6 in. long . . . . .

Sori narrow-linear with narrow thin indusia, variously arranged along the margins of the lobes. Fronds

4 to 8 in. long, 3 to 5 in. broad, with pinnatifid or pinnate pinnae . . . . .

12. *A. bulbiferum*.

13. *A. flaccidum*.

14. *A. pteridioides*.

SECT. III. *Athyrium*.—Sori small, often curved, mostly at the forks of the veinlets proceeding from the midrib.

Fronds large, membranous, twice or thrice pinnate . . . . .

15. *A. umbrosum*.

SECT. IV. **Diplasium**.—Sori linear along veins pinnately diverging from a central vein to each lobe of the pinnule. Indusium narrow, opening, in the same frond, on the one or the other or both sides of the nerve.

Fronds pinnate with pinnatifid pinnæ.

Rhizome creeping. Pinnæ deeply pinnatifid the lower lobes often divided to the midrib . . . . . 16. *A. japonicum*.

Rhizome short thick. Pinnæ pinnatifid with short broad lobes . . . . . 17. *A. sylvaticum*.

Fronds large, bipinnate. Trunk erect or shortly arborescent.

Lobes of the secondary pinnæ mostly broad and short. Sori and indusia narrow-linear . . . . . 18. *A. maximum*.

Lobes of the secondary pinnæ mostly triangular or lanceolate. Sori and indusia short and oblong . . . . . 19. *A. polypodioides*.

Lobes of the secondary pinnæ oblong or lanceolate. Sori and indusia dark-coloured mostly reaching the margin . . . . . 20. *A. melanochlamys*.

SECT. V. **Anisogonum**.—Sori and indusia of *Diplasium* but the lateral veinlets of each set frequently anastomosing with those of the adjoining set.

Fronds large, pinnate, the pinnæ 6 to 12 in. long, 1 to 1½ in. broad . . . . . 21. *A. decussatum*.

SECT. I. **EUSPLENIUM**.—Sori linear, diverging from the midrib or from the petiole towards the margin, the indusium opening from the upper or inner edge outwards.

1. **A. nidus**, Linn.; *Hook. Spec. Filic.* iii. 77, *Syn. Filic.* 190.—Rhizome short and thick. Fronds simple, entire, lanceolate, sessile or nearly so in large regular tufts hollowed in the centre, the larger ones 2 to 6 ft. long and 3 to 8 in. broad. Veins numerous, nearly transverse, parallel, simple or forked, connected at the end in an intramarginal line. Sori along the upper or inner side of nearly all the veins, mostly reaching from the midrib to ½ or nearly ¾ of their length.—*Bot. Mag.* t. 3101; *R. Br. Prod.* 150; *F. Muell. Fragm.* v. 130; *A. australasicum*, *Hook. Filic. Exot.* t. 88; *Thamnopteris nidus*, Presl; *Bedd. Ferns Brit. Ind.* t. 197.

**Queensland.** Broad Sound, *R. Brown*; York Peninsula, *N. Tayler*; Rockingham Bay, *Dallachy*; Daintree River, *Fitzalan*; Moreton Bay, *F. Mueller*; Rockhampton and neighbouring districts, *Bowman*, *Thozet* and others.

**N. S. Wales.** Port Jackson, *Woods*; Hastings River, *Beckler*; Clarence River, *Wileor*; Richmond River, *Mrs. Hedykisson*; Illawarra, *Johnson*; Twofold Bay, *F. Mueller*; Lord Howe's Island, *C. Moore*, *Fullagar*.

Widely spread over tropical Asia, extending to the Mascarene Islands on the one hand and to the Pacific Islands on the other.

2. **A. simplicifrons**, *F. Muell. Fragm.* v. 74.—Rhizome scaly. Fronds entire, membranous, 1 to 1½ ft long, ¾ to 1½ in. broad, tapering to a point and decurrent on the short stipes. Veins transverse, simple

or forked, mostly about 1 line apart, not connected within the margin. Sori linear, not reaching either the margin or the midrib.—Hook. and Bak. Syn. Fil. 193.

**Queensland.** Bellenden Ker Range, *W. Hill*; rocky stony places, Rockingham Bay, *Dallachy*; York Peninsula, *N. Taylor*.

**3. *A. attenuatum*, R. Br. Prod. 150.**—Rhizome tufted. Fronds linear-lanceolate, 6 in. to 1 ft. long,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. broad, entire the greater part of their length and tapering into a long point, often proliferous at the end, usually broken up in the lower part into a few obovate or oblong laterally aduate segments, the midrib scaly hairy underneath as well as the stipes. Veins very oblique, simple or forked. Sori variable in length, often reaching the midrib, rarely the margin.—Hook. Spec. Filic. iii. 92, Syn. Filic. 194, Ic. Pl. t. 914; Hook. and Grev. Ic. Filic. t. 220; F. Muell. Fragm. v. 130.

**Queensland.** Shaded woods, Moreton Bay, *A. Cunningham*, *F. Mueller* and others; Head of the Dee River, *Bowman*.

**N. S. Wales.** Grose River, *R. Brown*; Blue Mountains, *Woolfs*; Macleay and Bellinger Rivers, *C. Moore*; Richmond River, *Dargan*.

Var. *multilobum*, F. Muell. The greater part of the frond broken up into segments, but ending in the long entire point of *A. attenuatum*.—*A. paleaceum* var. *Prenticei*, Bak. Syn. Fil. 208.—Logan District, *Prentice*; Richmond River, *C. Moore*.

**4. *A. Trichomanes*, Linn.; Hook. Spec. Filic. iii. 136, Syn. Filic. 196, Brit. Ferns, t. 29.**—A small neat tufted fern. Fronds 2 to 6 in. high, simply pinnate, the rhachis slender, usually black. Pinnæ numerous, obovate orbicular or broadly oblong, nearly equal in size, those of the middle of the frond rather the largest, 2, 3 or rarely 4 lines long, more or less toothed. Veins forked, radiating from the midrib. Sori several on each pinna, oblong-linear and distinct when young, uniting in a circular mass when old.—Hook. f. Fl. Tasm. ii. 145; F. Muell. Fragm. v. 131.

**N. S. Wales.** Port Jackson to the Blue Mountains, *A. Cunningham*, *Woolfs*.

**Victoria.** Grampians, *Robertson*; Mount Aberdeen, Buffalo Ranges, Upper Snowy River, Gipps' Land, *F. Mueller*, *Walter*.

**Tasmania.** Cliffs of rocks by the Acheron and Franklin Rivers, *Gunn*.

Dispersed over the temperate regions of the Northern and Southern hemispheres in the New and the Old World, and in some mountainous districts within the tropics.

**5. *A. flabellifolium*, Cav.; Hook. Spec. Filic. iii. 146, Syn. Filic. 195, Exot. Fl. t. 208.**—Rhizome tufted. Fronds weak, straggling or prostrate, slender, from a few in. to 1 ft. long, simply pinnate. Pinnæ shortly petiolate, obliquely obovate orbicular or fan-shaped, toothed and the larger ones sometimes 3-lobed, 2 to 3 lines broad in the smaller specimens,  $\frac{1}{2}$  in. in the larger ones. Veins few, forked, pin-



pinnately diverging from a short midrib often divided at the base into three nearly equal branches. Sori several on each pinna, linear when young, often confluent when old.—R. Br. *Prod.* 150; Sieb. *Fl. Mixt.* n. 236; Hook. *f. Fl. Tasm.* ii. 145; F. Muell. *Fragm.* v. 131.

**Queensland.** Dalrymple Creek, *Hartmann*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *A. Cunningham* and others; New England, *C. Stuart*; Clarence and Hastings Rivers, *Beckler*, *Wilcox*; Illawarra, *A. Cunningham*, *Johnson*.

**Victoria.** Numerous localities from Melbourne and the Grampians to Gipps' Land, *Robertson*, *F. Mueller* and others.

**Tasmania.** Port Dalrymple *R. Brown*; abundant in most parts of the island, especially in rocky or stony situations, *J. D. Hooker*.

**W. Australia.** Lucky Bay, *R. Brown*; King George's Sound and neighbouring districts, *Oldfield* and several others.

Also in New Zealand.

**6. *A. paleaceum*, R. Br. *Prod.* 150.**—Rhizome tufted. Fronds decumbent, 6 in. to 1 ft. long, simply pinnate, sometimes proliferous at the end, the stipes rhachis and often the principal veins scaly-hirsute. Pinnae shortly petiolate, ovate ovate-lanceolate or fan-shaped, mostly  $\frac{1}{2}$  to  $\frac{3}{4}$  in. long, irregularly denticulate and sometimes obscurely 3-lobed, prominently striate with the radiating forked veins more or less joining in a midrib. Sori linear, often long but not reaching the midrib.—Hook. *Spec. Filic.* iii. 162, *f.* 199, *Syn. Filic.* 208; F. Muell. *Fragm.* v. 131.

**Queensland.** Broad Sound, *R. Brown*; Frankland Islands, *J. P. Gillies*; York Peninsula, *N. Taylor*; Rockingham Bay, *D. Beckler*; Rockhampton, *Bowman*, *O'Shanesy*, *Thozet*.

**7. *A. falcatum*, Lam. : Hook. *Spec. Filic.* iii. 160, *Syn. Filic.* 208.**—Rhizome tufted. Fronds from under 1 ft. to 2 ft. high including the rather long stipes, glabrous or sparingly scaly-hirsute, simply pinnate. Pinnae shortly petiolate, oblique, lanceolate, acuminate, serrulate, and usually more or less distinctly pinnatifid with short broad dentate lobes and sometimes auriculate at the base,  $1\frac{1}{2}$  to 4 in. long, coriaceous, prominently striate, the veins very oblique diverging from the base and from the midrib. Sori linear, long and nearly reaching the margin or a few quite short.—R. Br. *Prod.* 150; F. Muell. *Fragm.* v. 131; *A. caudatum*, Forst.; Hook. *Spec. Filic.* iii. 152, *Syn. Filic.* 209, at least as to the Australian specimens.

**Queensland.** Brisbane River, Moreton Bay, *A. Cunningham*, *F. Mueller*; Rockhampton, *O'Shanesy*; Rockingham Bay, *Dellachy*, with very long points to the pinnae.

**N. S. Wales.** Newcastle, *R. Brown*; New England, *C. Stuart*; Armidale, *Perrott*; Macleay and Hastings Rivers, *Beckler*; Richmond River, *Mrs. Hedykissin*; Illawarra, *Shepherd*; Lord Howe's Island, *C. Moore*, *Fullagar*.

Widely spread over tropical Africa, Asia, the Pacific Islands and New Zealand. Beddome, *Ferns* S. Ind. t. 141 and 143, figures *A. falcatum* and *A. caudatum*.



from specimens much more paleaceous than any Australian ones, but all appear to represent one species.

8. **A. obtusatum**, Forst.; Hook. Spec. Filic. iii. 96, Syn. Filic. 207, Filic. Exot. t. 46.—Rhizome thick, scaly. Fronds 6 in. to about 1 ft. high, the rachis and stipes usually rather thick, glabrous or sparingly scaly. Pinnae coriaceous, shortly petiolate, in the typical form obliquely oblong or ovate-lanceolate, obtuse,  $\frac{3}{4}$  to  $1\frac{1}{2}$  in. long, regularly crenate-toothed, and from that in some varieties to lanceolate, 3 to 5 in. long, toothed or pinnatifid. Veins from the midrib oblique and forked. Sori oblong-linear, not reaching the margin, usually several on each side of the midrib oblique equal and parallel.—Labill. Pl. Nov. Holl. ii. 93, t. 242; R. Br. Prod. 150; Hook. f. Fl. Tasm. ii. 145; *A. obliquum*, Forst.; Labill. l. c. 93, t. 242; *A. lucidum*, Forst.; Hook. f. Fl. Tasm. ii. 146.

**Tasmania.** Port Dalrymple, R. Brown; very abundant, especially on maritime rocks, J. D. Hooker.

Var. *difforme*. Pinnae very obtuse, more or less pinnatifid.—*A. difforme*, R. Br. Prod. 151; Sieb. Syn. Filic. n. 119, Fl. Mixt. n. 267.

**N. S. Wales.** Port Jackson, close to the sea, W. Ellis; Port Macquarrie, C. Moore; Clarence River, Woolls.

Var. *lucidum*. Pinnae obtuse, lanceolate, 2 to 5 in. long, obtusely serrulate, with very numerous parallel sori.—Lord Howe's Island, C. Moore, Fullagar.

Var. *lucisum*. Pinnae lanceolate, 3 to 5 in. long, deeply pinnatifid, with a sorus on each segment.—Lord Howe's Island, Fullagar.

The species is also in New Zealand and in extratropical South America. It is reduced by F. Mueller, Fragm. v. 132, to the European *A. merianii*, a union which pteridologists are not generally disposed to sanction.

9. **A. Hookerianum**, Colens.; Hook. Spec. Filic. iii. 194, Syn. Filic. 213.—A small tufted fern. Fronds rarely above 6 in. long, slender but rather rigid, mostly bipinnate, the rachis slightly scaly-hairy. Primary pinnae in the lower part of the frond  $\frac{1}{2}$  to 1 in. long, with 6 to 10 distinct oblong-cuneate dentate segments 1 to 2 or rarely 3 lines long, the lower ones tapering to a petiole, the upper ones as well as the upper pinnae small and confluent. Veins diverging, free. Sori few, usually only 1 or 2 on each segment, large in proportion.—*A. adiantoides*, Raoul; Hook. Ic. Pl. t. 983, not of Raddi.

**N. S. Wales.** Pieter River, Johnson, a single specimen apparently referable to this species but uncertain.

**Victoria.** Upper Hume River at an elevation of 4000 ft. and Colac Ranges F. Mueller.

Also in New Zealand.

10. **A. furcatum**, Thunb.; Hook. Spec. Filic. iii. 165, Syn. Filic. 214.—Rhizome thick, dark brown, scaly-hairy. Fronds 6 to 18 in. high, pinnate or bipinnate, slightly scaly-hairy. Pinnae lanceo-

late, mostly  $1\frac{1}{2}$  to 2 in. long, deeply pinnatifid or pinnate; segments varying from oblong-cuneate toothed and confluent to linear-cuneate distinct and deeply 2- to 4-lobed, the segments or lobes all coriaceous, denticulate at the end, striate with few diverging veins. Sori few, large.—Bedd. Ferns S. India, t. 144; F. Muell. Fragm. v. 131; *A. præmorsum*, Swartz; R. Br. Prod. 150.

**N. S. Wales.** Grose River, R. Brown, Mrs. Calvert.

**Victoria.** Darlot's Creek, Grampians, Allitt.

**W. Australia.** King George's Sound and neighbouring districts, Drummond, n. 349, Preiss n. 1301, Maxwell, F. Mueller.

Widely spread over tropical America, tropical and southern Africa and the Pacific Islands. The western specimens have the segments of the pinnules narrow and distinct, in those from N. S. Wales they are broader and more confluent, but all appear to belong to the African and American species.

**11. *A. laserpitiifolium*, Lam.; Hook. Spec. Filic. iii. 171, t. 203, Syn. Filic. 215.**—Rhizome thick, generally creeping up the trunks of tree-ferns and other trees. Fronds  $1\frac{1}{2}$  to 3 ft. long, glabrous, 3 or 4 times pinnate. Larger primary pinnae 6 to 8 in. long, with numerous secondary pinnae of 1 to 2 in., again pinnate or the upper ones shorter and pinnatifid only, the primary as well as the secondary pinnae tapering to a pinnatifid point. Ultimate pinnules or segments obovate or oblong-cuneate, toothed, prominently striate with diverging veins, mostly 3 or 4 lines long. Sori several on each segment, linear, usually rather small.—Bedd. Ferns S. Ind. t. 225.

**Queensland.** Endeavour River, A. Cunningham; Rockingham Bay, W. Hill, Dalley; Daintree River, Fitzalan; Fitzroy Island, M'Gillivray, Walter.

Also in East tropical Asia, the Malayan Archipelago and South Pacific Islands, and very near to the widely spread tropical *A. australas*, Lam., to which F. Mueller, Fragm. v. 131, reduces it and from which it differs chiefly in its much more compound fronds.

**SECT. II. DAREA.** Sori oblong or linear, on a vein proceeding from the midrib of the pinnae as in *Euasplenium* but on a branch parallel to the margin of its teeth or lobes with the indusium opening towards the margin so as to appear marginal.

**12. *A. bulbiferum*, Forst.; Hook. Spec. Filic. iii. 196, Ic. Pl. t. 423, Syn. Filic. 218.**—Rhizome thick. Fronds 1 to 2 ft. long, glabrous or with a scaly rhachis, pinnate or more frequently bipinnate, often proliferous. Primary pinnae numerous, usually 3 to 4 in. long. Pinnules lanceolate, mostly  $\frac{1}{2}$  to 1 in. long, pinnately toothed lobed or divided, with a single veinlet to each lobe or tooth; the whole frond as well as each pinna ending in a lanceolate toothed or lobed point. Sori large, one to each lobe or tooth, affixed to the central vein but the rather rigid prominent indusium thrown over towards the upper margin so as to make the sorus appear marginal.—Hook. f. Fl. Tasm. ii. 146;

*Cænopteris appendiculata*, Labill. Pl. Nov. Holl. ii. 94, t. 243; *Asplenium larum*, R. Br. Prod. 151.

**N. S. Wales.** Blue Mountains, *A. Cunningham*, Mrs. Culvert; Macleay and Bellinger Rivers, *C. Moore*; Clarence River, *Wilcox*.

**Victoria.** Mouth of the Glenelg, *Allitt*; Dandenong Ranges, Sealer's Cove, Apollo Bay, *F. Mueller*.

**Tasmania.** Derwent River, *R. Brown*; abundant in damp woods throughout the island, *J. D. Hooker*.

**S. Australia.** Mount Gambier, *F. Mueller*; Penola, *Woods*.

Scattered over various tropical and southern extratropical regions of the New and the Old World. Reduced by *F. Mueller*, *Fragm.* v. 132 with the following species to varieties of *A. marinum*, from which they appear to me to differ essentially in the position of the sori as well as in the forms assumed by the frond.

13. ***A. flaccidum***, *Forst.*; *Hook. Spec. Filic.* iii. 205, *Syn. Filic.* 222.—Rhizome short and thick. Fronds from under 1 ft. to near 2 ft. or in specimens not Australian still longer, pale green, glabrous, pinnate. Pinnae coriaceous, narrow, 3 to 6 in. long, the barren ones toothed, the fertile pinnately divided into linear lobes of 2 to 6 lines, each bearing a single rather large sorus attached to the central vein, but the conspicuous indusium thrown over to the upper side so as to appear marginal.—*Hook. f. Fl. Tasm.* ii. 146; *A. odontites*, R. Br. Prod. 151.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *A. Cunningham*, *Woods*; New England, *C. Stuart*; Hastings River, *Fraser*; Clarence River, *Beckler*, *Wilcox*; Bellinger River, *C. Moore*; Mlawarra, *Shepherd*.

**Victoria.** Mount Disappointment and Sealer's Cove, *F. Mueller*.

**Tasmania.** Not uncommon on exposed rocks, etc., *J. D. Hooker*.

Also in New Zealand.

14. ***A. pteridioides***, *Baker, Syn. Filic.* 188.—Rhizome thick and short. Fronds broadly ovate-lanceolate in outline, 4 to 8 in. long, 3 to 5 in. broad, glabrous, coriaceous, pinnate. Pinnae broadly lanceolate, again pinnate or deeply pinnatifid; segments from obovate to linear-cuneate,  $\frac{1}{2}$  to 1 in. long, with few obtuse teeth or short lobes; veins few, branching into the lobes. Sori linear, bordering the lobes on a branch of the vein parallel to and very near the margin; indusium narrow, proceeding from the nerve and opening outwards towards the margin.

**N. S. Wales.** Lord Howe's Island, *C. Moore*. *Fullagar*.

SECT. III. ATHYRIUM.—Sori small, often curved, mostly at the fork of veins proceeding from the midrib.

15. ***A. umbrosum***, *J. Sm.*; *Hook. Spec. Filic.* iii. 231, *Syn. Filic.* 229.—Fronds 3 to 5 ft. long, 1 to 1½ ft. broad, twice or thrice pinnate. Pinnules membranous, lanceolate or oblong, 1 to 2 in. long, deeply



pinnatifid or smaller and pinnately toothed; veins oblique, usually forked, proceeding from the midrib into the lobes or teeth, free. Sori small, oblong, usually on the vein below the fork or partly on one fork and then slightly curved. Indusium membranous, proceeding from the vein, and opening on the upper or inner margin, the sori often at length covering the centre of the pinnule.—F. Muell. Fragm. v. 132.; *Allantodia australis* and *A. tenera*, R. Br. Prod. 149; *Asplenium Brownii*, J. Sm.; Hook. Ic. Pl. t. 978; Hook. f. Fl. Tasm. ii. 147; *A. australe*, Brackenr.; Hook. Spec. Filic. iii. 232; *A. physosorus*, Sieb. Fl. Mixt. n. 268.

**Queensland.** Moreton Bay, *F. Mueller*; Towomba, *Hartmann*.

**N. S. Wales.** Paterson River, *R. Brown*; Blue Mountains, *A. Cunningham*, *Woolfs*; New England, *C. Stuart*; Macleay River, *Beckler*; Cape Byron and Tweed River, *C. Moore*, *Guilfoyle*; Illawarra, *Johnson*.

**Victoria.** Dandenong Ranges, *Beckler*; Broadribb and Snowy Rivers, *F. Mueller*; Cape Howe, *Walter*.

**Tasmania,** *Nelson*; not rare in dense shaded forests, *J. D. Hooker*.

Ranges over tropical Africa and Asia and is also in Norfolk Island and New Zealand.

SECT. IV. DIPLASIUM.—Sori linear along veins pinnately diverging from the central vein to each lobe of the pinnule. Indusium narrow, opening, in the same frond, sometimes on one side sometimes on the other or on both sides of the nerve.

16. *A. japonicum*, *Thunb.*; *Hook. and Bak. Syn. Filic.* 234.—Rhizome slender, creeping. Fronds pinnate, 1 to 1½ ft. long. Larger pinnae 3 to 4 in. long, deeply pinnatifid, the lower segments reaching the shortly scaly-hirsute rhachis. Sori usually rather shorter than in *A. sylvaticum*.

**N. S. Wales.** Illawarra, a single specimen in Herb. *F. Mueller*, without the collector's name, so possibly some mistake. The species is east Asiatic, extending to South China and Japan.

17. *A. sylvaticum*, *Presl*; *Hook. Spec. Filic.* iii. 248, *Syn. Filic.* 232.—Rhizome short thick and scaly. Fronds pinnate, from 1 to above 2 ft. long. Pinnae membranous, mostly attached by the midrib only or shortly petiolate, the larger ones 6 in. long, ¾ to 1 in. broad, regularly pinnatifid with short rounded denticulate lobes, with a central vein to each lobe and several oblique parallel veinlets proceeding from it, bearing linear sori extending from the midrib almost to the margin; indusia of the section, single or double; upper pinnae gradually smaller and more entire, the uppermost semi-decurrent or confluent.—*Bedd. Ferns S. Ind.* t. 161.

**Queensland.** Rockingham Bay, *Dallachy*.

Extends over tropical Africa and Asia including the Malayan Archipelago.

18. *A. maximum*, Don; Hook. and Bak. Syn. Filic. 239.—Trunk erect, from a few in. to  $2\frac{1}{2}$  ft. high. Fronds bipinnate, several feet long and 2 to 3 ft. broad, the larger pinnae closely resembling the entire fronds of *A. sylvaticum*. Secondary pinnae lanceolate, acuminate, 3 to 6 in. long,  $\frac{3}{4}$  to 1 in. broad, pinnatifid with short broad denticulate lobes, but the larger ones more deeply so than in *A. sylvaticum* and the smaller lobes more oblique and acutely toothed, the pinnae ending in a long lanceolate serrated point, the rhachis glabrous or slightly scaly. Sori narrow-linear and indusia entirely those of *A. sylvaticum*, to which the species is referred by F. Muell. Fragm. v. 133.

Queensland. Rockingham Bay, W. Hill, Dalrymple; Daintree River, Fitzalan.

N. S. Wales. Richmond River, C. Moore (referred in Syn. Filic. 235 to *A. sylvaticum*, Metten. under the impression that the specimens sent were whole fronds) Macleay River, Fitzgerald; Tweed River, Guilfoyle.

Common in East India.

19. *A. polypodioides*, Metten.; Hook. Spec. Filic. iii. 257, Syn. Filic. 238. — Trunk erect, attaining sometimes 3 or 4 ft. Fronds bipinnate, several feet long, 1 to 2 ft. broad, the stipes and rhachis without scales. Secondary pinnae mostly 3 to 4 in. long, lanceolate, shortly petiolate, acuminate, more or less deeply pinnatifid towards the base, the lower lobes lanceolate, falcate, minutely serrulate, the upper ones gradually shorter. Sori on the pinnate veins of the lobes as in the preceding species, but much shorter, rather oblong than linear. Indusia of the section opening on one or both sides of the vein.—F. Muell. Fragm. v. 132; *Diplazium polypodioides*, Metten.; Bedd. Ferns S. Ind. t. 163.

Queensland. Rockingham Bay, growing frequently in water. Dalrymple; Daintree River, Fitzalan; Dalrymple Creek, Hartmann.

Spread over East India and the Malayan Archipelago.

20. *A. melanochlamys*, Hook. Spec. Filic. iii. 259, Syn. Filic. 259. — Trunk unknown. Fronds bipinnate, 6 ft. long and 1 to 2 ft. broad, widely spreading, darker coloured and not so membranous as the preceding species. Secondary pinnae deeply pinnatifid; segments from oblong rounded and under  $\frac{1}{2}$  in., to lanceolate and above 1 in. long and then usually crenate with a tooth opposite each sorus. Sori and indusia linear, very conspicuous from their dark almost black colour, reaching usually almost from the midrib to the margin.

N. S. Wales. Lord Howe's Island, M'Gillivray, Milne, C. Moore, and others.

21. *A. decussatum*, Swartz; Hook. Spec. Filic. iii. 270, Syn. Filic. 243.—Trunk erect, scaly. Fronds 3 to 4 ft. long, pinnate, with a thick smooth rhachis. Pinnae shortly petiolate or attached by the midrib only, lanceolate, acuminate, 6 in. to near 1 ft. long, 1 to  $1\frac{1}{2}$  in.

broad, shortly dentate or some of the larger ones pinnatifid or almost pinnate. Primary veins proceeding obliquely from the midrib to the teeth or lobes, with secondary obliquely pinnate veinlets often anastomosing. Sori linear, on the secondary veinlets, with the single or double indusium of the section.—*Callipteris prolifer*a, Bory; Bail. Queensl. Ferns, 32.

**Queensland.** Rockingham Bay, *W. Hill, Dallachy*; Daintree River, *Fitzalan*.

Also in tropical Africa, the Malayan Archipelago and Pacific Islands.

### 31. CYSTOPTERIS, Bernh.

Delicate ferns, with twice or thrice pinnate fronds, with small dentate segments. Veins forked or pinnate, with free venules. Sori small, globular, attached to the concave base of an ovate indusium fixed on a venule at a distance from the margin.

A small genus spread over the temperate or mountain regions of both the northern and southern hemispheres, the only Australian species the most common in the general area of the genus. It is generally placed near *Dicella* on account of the concave indusium, but the position of the sori and the texture and early disappearance of the indusium show an affinity to *Aspidium*, in which the spore-cases are frequently affixed in part to the indusium, though never wholly so as in *Cystopteris*.

1. *C. fragilis*, Bernh.; *Hook. Spec. Filic.* i. 197, *Brit. Ferns*, t. 23, *Syn. Filic.* 103.—Rhizome creeping, scaly. Fronds usually 6 to 9 in. high, ovate-lanceolate or oblong in their outline, twice pinnate, the longest primary pinnae 1 to 1½ in. long, decreasing towards both ends, on a slender stipes without scales. Segments ovate or lanceolate, pinnatifid or dentate, with obtuse lobes or teeth. Sori several on each segment, at first enclosed in the indusium which is small and thin in the Australian specimens and soon disappears under the enlarged globular sori.—*Hook. f. Fl. Tasm.* ii. 136, t. 166; *Bedd. Ferns Brit. Ind.* t. 91 (the indusium in all the figures larger than in any Tasmanian specimens); *C. tasmanica*, *Hook. Spec. Filic.* i. 199, *lc. Pl.* t. 959.

**Tasmania.** Moist rocks, Mount Olympus and Lake St. Clair, *Gunn*.

### 32. ASPIDIUM, Swartz.

Rhizome thick and shortly erect or creeping. Fronds once twice or thrice pinnate, rarely in species not Australian, simple. Sori orbicular, usually small, variously dispersed over the under surface. Indusium orbicular, covering the sorus when young, attached by the centre or by a point or in a sinus on one side, so that when opened all round by the growth of the spore-cases it becomes peltate or more or less reniform.











A large genus, distributed over every part of the globe, closely allied to *Polypodium*, with nearly as great a variety of division and venation of the frond, differing only in the presence of an indusium which in several species disappears very early. Of the 16 Australian species four have a very general distribution in the New and the Old World, seven are limited to the Old World, chiefly in Asia and the Pacific Islands, two others are in New Zealand, one of them also in the Pacific Islands, the three remaining ones are as far as known endemic.

Fronds pinnate, with numerous nearly equal pinnae articulate on a long rhachis. Sori in a regular row close to or not far from the margin (**Nephrolepis**).

Pinnae rather rigid, obliquely truncate or cordate at the base.

Pinnae rarely above 1 in. long, obliquely cordate . . . 1. *A. cordifolium*.

Pinnae 2 to 5 in., obliquely truncate at the base . . . 2. *A. exaltatum*.

Pinnae membranous, narrow and tapering at the base on one side, broadly auriculate on the other . . . 3. *A. ramosum*.

Fronds pinnate. Pinnae pinnatifid, with a pinnate vein leading to each lobe, the veinlets under adjoining lobes uniting in a vein leading to the sinus (**Nephrodium**).

Lower pinnae scarcely smaller than the others.

Sori in 2 rows near the margins of the lobes usually continued into the entire part . . . 4. *A. unitum*.

Sori close to the margins of the lobes and not continued below the sinus . . . 5. *A. pteroides*.

Lower pinnae gradually much smaller and distant.

Fronds rarely above 2 ft. long. Lobes of the pinnae rather obtuse or acute . . . 6. *A. molle*.

Fronds often 4 to 5 ft. long. Lobes of the pinnae broad, very obtuse or truncate . . . 7. *A. truncatum*.

Fronds deeply pinnatifid or pinnate, with reticulately veined pinnae (**Sagenia**) . . . 8. *A. confluens*.

Fronds twice or thrice pinnate with lobed or toothed segments, Indusium usually peltate (**Polystichum**).

Stipes very shaggy. Segments ovate-lanceolate, prickly toothed, with an angular lobe at the base . . . 9. *A. aculeatum*.

Stipes slightly scaly. Segments lanceolate, pinnatifid or pinnate, the teeth mostly aristate . . . 10. *A. aristatum*.

Segments lanceolate, coriaceous, obtusely toothed lobed or pinnate . . . 11. *A. capense*.

Fronds twice or thrice pinnate with lobed or toothed segments. Indusium usually reniform, often very small and soon disappearing, sometimes abortive (**Lastrea**).

Fronds glabrous or pubescent.

Segments rather coriaceous, obtusely toothed or lobed. Sori in marginal lines at the upper end . . . 12. *A. apicale*.

Segments acutely toothed or lobed. Sori near the midrib . . . 13. *A. decompositum*.

Segments acutely toothed or pinnatifid. Sori near the margin . . . 14. *A. tenerum*.

Pinnae and pinnules ciliate with white hairs or bristles . . . 15. *A. tenericaule*.

Stipes and principal rhachis hispid with long dark hairs or bristles. Pinnules and segments acutely toothed . . . 16. *A. hispidum*.

1. *A. cordifolium*, Swartz, *Syn. Filic.* 45.—Rhizome emitting wiry fibres bearing ovoid scaly tubers (stolones?). Fronds 1 to 2 ft. long, weak, simply pinnate. Pinnæ very numerous and regularly approximate, nearly sessile but articulate on the rhachis, oblong, rounded and usually denticulate at the end,  $\frac{3}{4}$  to 1 in. long, obliquely cordate at the base with the upper auricle much the largest, gradually smaller at the end of the frond, and the lowest pinnæ short broad and barren. Veins obliquely diverging from the midrib, forked or branched. Sori terminating each lower branch, forming a row at some distance from the margin. Indusium orbicular, very prominent, attached in a deep sinus or rarely peltate.—*Nephrolepis cordifolia*, Presl; Hook. and Bak. *Syn. Filic.* 300; *Aspidium tuberosum*, Bory; F. Muell. *Fragm.* v. 136; *Nephrolepis tuberosa*, Presl; Hook. *Spec. Filic.* iv. 151; Bedd. *Ferns* S. Ind. t. 92.

**Queensland.** Rockingham Bay, *Dallachy*; Brisbane River, Moreton Bay, *W. Hill*, *F. Mueller*.

**N. S. Wales.** Clarence River, *Bekker*; Richmond River, *C. Moore*, *Mrs. Hodgkinson*; Lord Howe's Island, *C. Moore*, *Fullagar*.

Spread over the tropical regions of the New and the Old World.

2. *A. exaltatum*, Swartz, *Syn. Filic.* 45.—Fronds weak, often above 2 ft. long, simply pinnate, the rhachis glabrous or loosely scaly-tomentose. Pinnæ very numerous, nearly sessile but articulate on the rhachis, lanceolate, mostly acuminate and crenate, obliquely truncate at the base and sometimes auriculate on the upper side, the longer ones 3 to 5 in. long, with numerous fine forked veins obliquely diverging from the midrib, the lower pinnæ usually shorter rounded at the end and barren. Sori terminating one branch of the veins, forming a regular row usually close to the margin. Indusium orbicular, laterally attached in a deep sinus or sometimes peltate and opening all round.—*F. Muell. Fragm.* v. 136; *Nephrodium exaltatum*, R. Br. *Prod.* 148; *Nephrolepis exaltata*, Schott; Hook. *Spec. Filic.* iv. 152, *Syn. Filic.* 301.

**N. Australia.** North Coast, *McKinlay*; Liverpool River, *Gulliver*.

**Queensland.** Port Bowen, *R. Brown*, *A. Cunningham*; Cape York, *Daintree*; York Peninsula, *N. Taylor*; Endeavour River, *A. Cunningham*; Rockingham Bay, *W. Hill*, *Dallachy*; Daintree River and Port Denison, *Fitzinger*; Gilbert River, *Daintree*; islands off the coast, *McGillivray*, *Thozet* and others.

Widely spread over the tropical regions of the New and the Old World.

**Var. longipinna.** Larger pinnæ 6 in. long,  $\frac{1}{2}$  to  $\frac{3}{4}$  in. broad, with the row of sori at a considerable distance from the margin.—North coast, *McKinlay*; Rockingham Bay, *Dallachy*.

3. *A. ramosum*, *Beaur. Fl. Ov. et Ben.* ii. 53, t. 91.—Rhizome slender, scaly, creeping up the stems of trees to a great length. Fronds weak, varying from a few inches to above 1 ft. long. Pinnæ numerous, obliquely oblong, obtuse, crenate, very oblique at the base, articulate on the rhachis, the lower side narrowed the upper broadly truncate



and often auriculate, 1 in. long and 3 to 4 lines broad in the larger fronds,  $\frac{1}{2}$  in. long and 1 to  $1\frac{1}{2}$  lines broad in the smaller ones, with every intermediate size. Veins diverging from the midrib once or twice forked. Sori in a regular row between the midrib and the margin. Indusium orbicular, usually attached in a deep sinus, but sometimes peltate.—*Nephrolepis ramosa*, T. Moore; Hook. and Bak. Syn. Filic. 301; *Nephrodium obliteratum*, R. Br. Prod. 148; *Aspidium obliteratum*, Spreng. Syst. iv. 99; F. Muell. Fragm. v. 135; *Nephrolepis obliterata*, Hook. Spec. Filic. iv. 154; Bedd. Ferns S. Ind. t. 251; *Polypodium?* *Beckleri*, Hook. Spec. Filic. iv. 224; *N. repens*, Brackenr.; Bail. Queensl. Ferns, 50; *N. alcescens*, Bail. l. c. 51, not of Baker.

**Queensland.** Endeavour River, *Banks and Schimper*; A. Cunningham; Cape York Peninsula, *Holboell*; *Engelmann*; N. Toller; Rockingham Bay, *Dallwitz*; Daintree River, *Fitzalan*; Dalrymple Creek, *Hartmann*.

**N. S. Wales.** Cape Byron, *Forsk.*; Belling and Richmond Rivers, *C. Moore*; New England, *C. Stuart*; Musgrave River, *Beckler*; Barrina and Illawarra, *Moore*, *C. Moore* and others.

Spread over tropical Africa and Asia and the Pacific Islands.

4. *A. unitum*, Swartz., Syn. Fil. 47.—Rhizome stout, creeping. Fronds 1 to 2 ft. long on a stipes often as long, simply pinnate, pubescent or rarely glabrous. Pinnae narrow-lanceolate, 3 to 6 in. long, sessile but not adnate or the lower ones shortly petiolate, rather firm, regularly pinnatifid, the lobes usually reaching to about the middle, broad, rather acute, often falcate. Veins pinnate to each lobe, the branches or veinlets of adjoining lobes uniting in a vein leading to the sinus. Sori at the end of the veinlets forming usually a close row along the margin of the lobes. Indusium orbicular-reniform or almost peltate, very small and soon disappearing.—F. Muell. Fragm. v. 135; *Nephrodium unitum*, R. Br. Prod. 148; *N. propinquum*, R. Br. l. c.; Hook. Spec. Filic. iv. 79.

**N. Australia.** Near Providence Hill, *F. Mueller*.

**Queensland.** Endeavour River, *Banks and Schimper*; Lizard Island, *McGillivray*; York Peninsula, *N. Toller*; Rockingham Bay, *Dallwitz*; Port Darwin, *Fitzalan*; Rockhampton, *Thwait*; Brisbane River, Morton Bay, *A. Cunningham*, *F. Muell.*

**N. S. Wales.** Port Jackson, *A. Cunningham*; New England, *C. Stuart*; Tweed River, *C. Moore*; Richmond River, *Mrs. Holboell*; also in *L. Hitchcock's* collection.

**W. Australia,** *Drummond*, n. 400.

Widely spread over tropical Africa and Asia and closely allied to the common tropical American *A. adn.* Sw.; Brown restricted the name of *unitum* to the glabrous form to which belong a few of the Queensland specimens, and distinguished the more or less pubescent one which is the most common, as *N. propinquum*, relying however apparently only on the single specimens of each in Herb. Banks.

5. *A. pteroides*, Swartz., Syn. Filic. 47.—Nearly allied to *A. unitum*, with the same pinnatifid pinnae and venation. Fronds taller,

glabrous or minutely pubescent. Pinnae membranous, usually 6 to 8 in. long and about  $\frac{1}{2}$  in. broad, mostly petiolate, the lower ones scarcely smaller, the lobes reaching about  $\frac{3}{4}$  way to the midrib. Sori rather large, in close marginal rows. Indusium orbicular-reniform.—*Nephrodium terminans*, Hook. Spec. Filic. iv. 73; *N. pteroides*, J. Sm.; Hook. and Bak. Syn. Filic. 289.

**Queensland.** Rockingham Bay, *Dallachy*.

Spread over tropical Asia and the Pacific Islands.

6. **A. molle**, Swartz, Syn. Filic. 49.—Rhizome short and thick. Fronds 1 to 2 ft. long on a stipes often as long, simply pinnate, glabrous or hirsute, usually of a light green. Pinnae lanceolate, the longer ones 3 to 6 in. long or even more, often acuminate, regularly pinnatifid, the lobes sometimes short sometimes reaching above halfway to the midrib, the pinnae truncate at the base, mostly sessile, the lower ones gradually smaller and more distant. Veins pinnate in each lobe and prominent, the branches or veinlets of adjoining lobes united in a vein tending to the sinus. Sori usually in a row about halfway between the midrib of the lobe and the margin. Indusium orbicular-reniform, soon disappearing.—F. Muell. Fragm. v. 135; *Polypodium molle*, Jacq. Ic. Rar. t. 640; *Nephrodium molle*, R. Br. Prod. 149; Hook. Spec. Filic. iv. 67, Syn. Filic. 293; Bedd. Ferns S. Ind. t. 84.

**N. Australia.** Johnstone River, *Gulliver*.

**Queensland.** York Peninsula, *N. Taylor*; Rockingham Bay, *W. Hall*, *Dallachy*; Bowen. Woods; Brown River, *McGillivray*; Port Denison and Daintree River, *Fitzalan*; Rockhampton, *Bowman*, *O'Shaunessy*; Moreton Bay, *F. Mueller*, *C. Stuart*.

**N. S. Wales.** Blue Mountains, *R. Brown*; New England, *C. Stuart*; Hastings, Macleay and Clarence Rivers, *Beckler* and others; Richmond River, *Mrs. Hodgkinson*; Illawarra, *Johnson*; Lord Howe's Island, *C. Moore*.

Var. *didymosorus*. Sori 1 or 2 to each lobe and only at the junction of the lowest veinlets of adjoining lobes.—*Nephrodium didymosorum*, Bedd. Ferns Brit. Ind. t. 200.—Rockingham Bay, *Dallachy*.

The genus is spread over tropical Asia and Africa and the Pacific Islands.

7. **A. truncatum**, Gaudich. in Freyc. Voy. Bot. 332, t. 10.—Very closely allied to *A. molle*, and difficult to distinguish by any positive characters. Usually a larger plant, the fronds often 4 or 5 ft. high and sometimes more, the larger pinnae 6 in. to 1 ft. long, the lobes more obtuse, often quite truncate.—*Nephrodium truncatum*, Presl; Hook. and Bak. Syn. Filic. 294; *N. abruptum*, Presl; Hook. Spec. Filic. iv. 77, t. 241; Bedd. Ferns S. Ind. t. 86; *Aspidium extensum*, F. Muell. Fragm. v. 135, but scarcely of Blume.

**Queensland.** A specimen from Rockingham Bay is referred here by Baker but is rather doubtful.

**N. S. Wales.** Duck Creek, Richmond River, *C. Moore*; Tweed River, *Guilfoyle*.

Also in tropical Asia and the Pacific Islands.

**8. *A. confluens*, Metten. in *Linnaea*, xxxvi. 125.**—Fronds 1 to 2 ft. long or rather more, deeply pinnatifid or pinnate at the base. Segments lanceolate, often numerous, the upper ones 2 to 6 in. long, pinnately toothed or lobed, confluent on the broadly winged rhachis, the intermediate ones 6 to 10 in. long, deeply pinnatifid and decurrent on the rhachis, the lowest pair quite free at the base, pinnatifid with long lanceolate lobes, of which the outer ones are again pinnatifid, all membranous. Veins copiously netted. Sori scattered, either on short veinlets free in the areoles or on the anastomosing veinlets. Indusium when perfect rather large, orbicular, peltate or on the same frond attached by a deep sinus.—*Nephrodium confluens*, F. Muell.; Hook. and Bak. Syn. Filic. 504; *A. melanocaulon*, F. Muell. Fragm. v. 133, not of Blume; *Sagenia melanocaulon*, Bail. Queensl. Ferns, 47.

**N. Australia.** Johnstone River, *Gulliver*.

**Queensland.** Rockingham Bay, *Dallachy*; Daintree River, *Fitzalan*; York Peninsula, *N. Taylor*.

**9. *A. aculeatum*, Swartz; Hook. Spec. Filic. iv. 18, Brit. Ferns, t. 10 to 12, Syn. Filic. 252.**—Rhizome short and thick. Fronds 1 to 2 ft. high, twice pinnate, the lower part of the stipes and the whole frond when young very shaggy with dark brown scarios scales mixed with hairlike ones. Primary pinnae lanceolate in outline,  $1\frac{1}{2}$  to 4 in. long, the lower ones decreasing in length; pinnules ovate-lanceolate, curved, 3 to 6 lines long, prickly-toothed, with a prominent angle or lobe on the upper or inner side. Veins forked, diverging from the midrib. Sori usually 6 to 8 on each pinnule.—F. Muell. Fragm. v. 134; Sieb. Syn. Filic. n. 104; *A. proliferum*, R. Br. Prod. 147; *Polystichum vestitum*, Presl; Hook. f. Fl. Tasm. ii. 148.

**Queensland.** Head of Dalrymple Creek, *Hartmann*.

**N. S. Wales.** Port Jackson, *Woods*; Clarence River, *Beckler*; Richmond River, *C. Moore*; Macleay River, *Fitzgerald*; Illawarra, *Johnson*.

**Victoria.** From Portland and the Grampians to Gipps' Land, *F. Mueller* and others.

**Tasmania.** Derwent River, *R. Brown*; abundant in subalpine situations, *J. D. Hooker*.

In most temperate and subtropical regions of the globe.

**10. *A. aristatum*, Swartz; Hook. Spec. Filic. iv. 27, Syn. Filic. 255.**—Fronds 1 to 2 ft. high, broadly ovate-triangular in outline, twice pinnate or the lower pinnae again pinnate at the base, firm but thin, light green and glossy, the stipes scaly-hairy at the base. Pinnules or segments very obliquely oblong or lanceolate,  $\frac{1}{2}$  to 1 in. long, narrowed or cuneate at the base, bordered at the end by a few teeth ending in



bristle-like points. Veins forked, diverging from the midrib. Sori small, not numerous, loosely arranged in 2 rows. Indusium small, orbicular-reniform.—F. Muell. Fragm. v. 134; *Lastrea aristata*, T. Moore; Bail. Queensl. Ferns, 49.

**Queensland.** Rockingham Bay, *Dallachy*; Port Denison, *Fitzalan*.

**N. S. Wales.** New England, *C. Sower* (with fronds thrice pinnate); Hastings River, *Beckler*; Tweed River, *Guilfoyle*; Illawarra, *C. Moore*.

Spread over Eastern Asia from the Hindayas to Japan, in the Pacific Islands and South Africa.

11. *A. capense*, Willd.; *Hook. and Bak. Syn. Filic.* 254.—Rhizome creeping. Fronds from under 1 ft. to 2 ft. high, usually broad, rigid, the stipes and rachis more or less scaly, mostly twice pinnate but the smaller ones occasionally simply pinnate. Pinnæ coriaceous, lanceolate, toothed or pinnatifid, with reticulate veins concealed in the thick tissue. Sori often large, 1 to each tooth or lobe. Indusium peltate and rigid, but fallen away from old sori.—*Polypodium capense*, Linn.; *Aspidium coriaceum*, Swartz; Hook. Spec. Filic. iv. 32; R. Br. Prod. 148; F. Muell. Fragm. v. 134; *Polystichum coriaceum*, Schott; Hook. f. Fl. Tasm. ii. 148.

**N. S. Wales.** Port Jackson to the Blue Mountains, *Woots*; Macleay River, *Fitzgerald*; Twofold Bay, *F. Mueller*; Lord Howe's Island, *C. Moore*, with a large variety with compound fronds and a very shaggy rachis.

**Victoria.** Mount Disappointment and Apollo Bay, *F. Mueller*; Cape Howe, *Walter*.

**Tasmania.** Derwent River, *R. Brown*; not uncommon in forests, etc., *J. D. Hooker*.

Generally spread over the tropical and southern extratropical regions of the globe.

12. *A. apicale*, *Baker*.—Fronds in general outline and division those of the larger broader specimens of *A. decompositum*, twice or thrice pinnate with pinnatifid pinnules, but of a firmer texture. Segments obtusely toothed or lobed, with 1 or 2 sori on the longer teeth forming usually a marginal line round the upper part of the segment. Veins pinnate with free venules. Indusium orbicular-reniform, much larger and more persistent than in any variety of *A. decompositum*, or *A. tenerum*.—*Nephrodium apicale*, *Bak. Syn. Filic.* 499.

**N. S. Wales.** Lord Howe's Island, *C. Moore*.

13. *A. decompositum*, *Spreng. Syst.* iv. 109.—Rhizome short and thick or longer and creeping. Fronds glabrous or the rachis and primary nerves pubescent, very variable in size and outline, the smaller ones ovate-lanceolate, 6 in. to near 1 ft. long, on a stipes often nearly as long, pinnate with deeply pinnatifid pinnæ, the larger ones twice as long, much broader in proportion and thrice pinnate. Primary and secondary pinnæ ending in a narrow pinnatifid apex. Pinnules or

segments lanceolate, 2 to 3 lines broad, pinnately toothed or lobed, the teeth acute or mucronate and the margin of the lobes usually nerve-like. Veins pinnate, more or less divided according to the division of the pinnules. Sori usually 1 or 2 to each principal lobe not very far from the midrib. Indusium orbicular-reniform often concealed as the sorus enlarges, and sometimes perhaps deficient from the first — *F. Muell. Fragm. v. 135*; *Nephrodium decompositum*, R. Br. Prod. 149; Hook. Spec. Filic. iv. 146, Syn. Filic. 281; Hook. f. Fl. Tasm. ii. 149, Fl. N. Zel. t. 79; *Lastrea decomposita*, Presl; Bail. Queensl. Ferns, 49.

**Queensland.** Broad Sound, *R. Brown*; Rockingham and Cleveland Bay, *Dallachy*; Bowen, *Walls*; Brisbane River, Moreton Bay, *F. Muell. C. Stuart*; Rockhampton and other localities in South Queensland, *Thozet* and others.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown* and others; New England, *C. Stuart*; Hastings, Macleay and Clarence Rivers, *Backer*; Richmond River, *Mrs. Hodgkinson*; Tweed River, *Gaillard*; Illawarra, *A. Cunningham*, *C. Moore*.

**Victoria.** Wannon River, *R. Brown*; numerous localities from Dandenong and Western Port to Genoa River, *F. Mueller* and others.

**Tasmania.** Woods around Hobarton, *Green*, *J. D. Hooker*; Cuming's Head, *C. Stuart*.

**S. Australia.** Penola, *Woods*.

Also in New Zealand and the Pacific Islands.

Some specimens with small fronds and broader, more membranous and less acute segments appear almost identical with specimens of *Polypodium robustum*, Blume, from Ceylon. The supposed Australian specimens of that species are undoubtedly referable to *A. decompositum*, and *Nephrodium lancilobum*, Bak. Syn. Filic. 499, appears to me to be inseparable from the larger more divided specimens of the same species.

**14. A. tenerum**, Spreng. Syst. iv. 109.—Very near *A. decompositum* and varies like it in the fronds twice or thrice pinnate, with the lobes or teeth acute, but the pinnules and segments are more regular and more regularly pinnately lobed or dentate, the parallel branches of the veins much more numerous, and the sori are close to the margin at a distance from the midrib.—*Nephrodium tenerum*, R. Br. Prod. 149.

**Queensland.** Koppell Bay, *R. Brown*; Mount Elliott, *Fitzinger*; Mount Mueller, *Dallachy*; Rockhampton, *Bowman*; Moreton Bay, *C. Stuart*.

**N. S. Wales.** Richmond River, *Henderson*, *Mrs. Hodgkinson*; Bellinger River, *Fitzgerald*; Tweed River, *Gaillard*.

**15. A. tenericaule**, Thw. Enum. Pl. Ceyl. 393.—Rhizome short and thick or creeping. Fronds 1 to 3 ft. long on a stipes of 1 to 2 ft., twice pinnate, the larger primary pinnae 6 to 8 in. long. Pinnules lanceolate, 1 to 1½ in. long on the larger pinnae, very deeply pinnatifid with numerous lanceolate lobes 1 to 3 lines long, all more or less decurrent, ciliate on the margins as well as the principal veins and rhachis with rigid white hairs or bristles. Veins branched in each lobe but free. Sori 1 to 6 in each lobe, small and distinct with few spore-

cases, or larger and confluent. Indusium very small and only to be seen on young sori.—F. Muell. Fragm. v. 133; *Nephrodium tenericaule*, Hook. Spec. Filic. iv. 142, t. 269; *Aspidium uliginosum*, Kunze in Linnæa, xx. 6; Metten. in Ann. Mus. Lugd. Bat. i. 229; *Lastrea flaccida*, Bedd. Ferns S. India, t. 99; *Nephrodium setigerum*, Bak. Syn. Filic. 284.

**Queensland.** Rockingham Bay, W. Hill, Dallachy; Bowen, Wells; Daintree River, Fitzalan.

**N. S. Wales.** Clarence River, Herb. F. Mueller.

Spread over tropical Asia from Ceylon and the Archipelago to Japan and the Pacific Islands.

16. **A. hispidum**, Swartz, Syn. Fil. 56.—Rhizome thick, creeping, covered with brown scales. Fronds 1 to 2 ft. long, broadly ovate or triangular in outline, usually thrice pinnate with acuminate pinnae, the stipes and primary and secondary rachis hispid with long fine spreading dark-coloured hairs or bristles. Pinnules lanceolate, deeply pinnatifid,  $\frac{1}{4}$  to  $\frac{1}{2}$  in. long, deeply and sharply toothed. Veins solitary to each lobe or tooth. Sori solitary on the smaller segments or lobes. Indusium orbicular, attached by a lateral sinus or almost peltate.—F. Muell. Fragm. v. 133; *Nephrodium hispidum*, Hook. Spec. Filic. iv. 150, Syn. Filic. 286; *Aspidium setosum*, Schkuhr, Filic. t. 49.

**Victoria.** Cape Otway Ranges, Wilkinson.

Also in New Zealand.

### 33. POLYPODIUM, Linn.

Rhizome creeping in all the Australian species, with small brown scales with a broad adnate base and more or less acute or subulate points. Fronds simple pinnate or compound. Sori orbicular very rarely oblong, variously dispersed over the under surface, without any indusium.

A large genus distributed over every part of the globe except the coldest or high alpine regions. Of the 24 Australian species, 12 belong to the Indo-Australian region extending over the Malayan Archipelago, more or less into East India and the Pacific Islands, a few of them also African, but none of them identified with American species, 7 are in New Zealand or the South Pacific Islands or in both, 2 more are common to New Zealand and the extreme south of America, the remaining 3 appear to be endemic.

In the Australian species, where the frond is small, the creeping rhizomes usually form dense matted patches on rocks and trunks of trees, in the larger species the rhizome often creeps up the trunks of trees to a great length. In most species the stipes is more or less distinctly articulate on the rhizome.

**SERIES I. Dianeura.**—Veins diverging from the midrib forked or branched, the branches not anastomosing. Sori terminating or near the end of one of the branches.







Fronds coriaceous, entire or pinnatifid, glabrous or ciliate-hairy, the venation usually concealed in the thick texture of the frond (**Eupolypodium**).

- Fronds entire, glabrous. Sori oblong or linear . . . 1. *P. australe*.  
 Fronds entire, ciliate with long brown hairs . . . 2. *P. Hookeri*.  
 Fronds pinnatifid with short lanceolate entire lobes . . . 3. *P. blechnoides*.  
 Fronds pinnatifid with linear dentate or pinnatifid lobes . . . 4. *P. grammitidis*.

(No corresponding *Aspidia*.)

Fronds pinnate, with numerous undivided pinnae articulate on the rachis (**Arthropteris**) . . . 5. *P. tenellum*.

(See sect. *Nephrolepis* of *Aspidium*.)

Fronds decompose, twice or thrice pinnate with pinnatifid pinnules (**Phegopteris**) . . . 6. *P. punctatum*.

(See sect. *Lastrea* of *Aspidium*.)

SERIES II. **Synneura**.—Branches of parallel primary veins uniting but not reticulate.

Fronds pinnate. Pinnae broadly crenate or equally pinnatifid, with a pinnate vein leading to each lobe, the veinlets under adjoining lobes uniting in an intermediate vein leading to the sinus (**Goniopteris**).

- Fronds spreading, proliferous. Pinnae 1 to 4 in. long.  
 Sori chiefly near the margin . . . 7. *P. proliferum*.  
 Fronds tall, erect. Pinnae 6 to 12 in. Sori in 2 parallel rows between each 2 primary veins . . . 8. *P. urophyllum*.  
 Fronds erect, densely villous . . . 9. *P. Hillii*.

(See also sect. *Nephrodium* of *Aspidium*.)

Fronds and venation of *Goniopteris* except that the branches of the primary veins anastomose but do not form a parallel intermediate vein . . . 10. *P. pœcilophlebium*.

SERIES III. **Dictyoneura**.—Venation reticulate between more or less distinctly parallel primary veins, with a small free usually clavate veinlet in a few or in many of the areolæ. Sori on the free or on the connecting veinlets.

Fronds coriaceous, entire or rarely forked, covered with stellate hairs or scales, the fertile ones narrow, the barren often short and broad. Venation concealed in the thick texture (**Nipholobus**).

- Fronds under 1 in. long. Sori rather large, irregularly placed often contiguous. Scales very dense . . . 11. *P. serpens*.  
 Fronds 3 to 12 in. long. Sori large, oval, in a single row on each side of the midrib. Scales small . . . 12. *P. confuens*.  
 Fronds 6 in. to 2 ft. long. Sori small, very numerous, and densely crowded in many rows. Scales minute . . . 13. *P. areostictoides*.

Fronds without stellate scales. Sori large and distant in a single row (or 2 in *P. phymatodes*) on each side of the midrib, each sorus in a cavity forming a pustule on the upper surface (except *P. simplicissimum*) (**Goniophlebium** and **Phymatodes**).

- Fronds long and narrow, entire or crenate.  
 Fronds coriaceous smooth and shining, the venation concealed in the texture . . . . . 14. *P. attenuatum*.  
 Fronds rigidly membranous, the larger veins conspicuous . . . . . 15. *P. simplicissimum*.  
 Fronds deeply pinnatifid with long segments confluent in a broad wing to the rhachis.  
 Fronds usually above 1½ ft. high.  
 Segments membranous, showing the veins, 6 in. to 1 ft. long, 1 to 1½ in. broad, with narrow points . . . . . 16. *P. nigrescens*.  
 Segments smooth, the veins inconspicuous, 4 to 8 in. long, ¾ to 1½ in. broad . . . . . 17. *P. phymatodes*.  
 Fronds usually under 1½ ft. high.  
 Segments rather firm, showing the primary veins, 3 to 6 in. long, 4 to 8 lines broad . . . . . 18. *P. pustulatum*.  
 Segments membranous, smooth, the veins scarcely conspicuous, rarely above 3 in. long . . . . . 19. *P. scandens*.  
 Fronds pinnate, the pinnæ articulate on the rhachis at least when fertile.  
 Pinnæ membranous, 6 to 8 in. long, ½ to 1 in. broad, cuneate at the base . . . . . 20. *P. verrucosum*.  
 Pinnæ 3 to 6 in. long, 3 to 5 lines broad, serrate, truncate or auriculate on the base . . . . . 21. *P. subauriculatum*.  
 Pinnæ rigid, 3 to 9 in. long, 3 to 9 lines broad, cuneate at the base. Barren fronds sessile, short and broad . . . . . 22. *P. rigidulum*.  
 Fronds without stellate scales. Sori irregularly scattered or in several rows, with a very slight or no corresponding prominence on the upper surface.  
 Fronds entire, long and broad. Sori numerous and small . . . . . 23. *P. irioides*.  
 Fronds deeply pinnatifid with long segments confluent in a broad wing to the rhachis. Sori large, in about 2 rows.  
 Venation inconspicuous. Single free veinlets in several areolæ. Receptacle prominent on the upper surface . . . . . 17. *P. phymatodes*.  
 Venation conspicuous. Sori at the junction of 2 veinlets. No single free veinlets . . . . . *P. aureum*.  
 Fronds deeply pinnatifid. Sori numerous and small.  
 Barren fronds sessile, short and broad . . . . . 24. *P. quercifolium*.

(See also sect. *Sagenia* in *Aspidium*.)

SERIES I. DIANEURA.—Veins pinnate, the venules diverging from a midrib, simple or forked, the branches free. Sori inserted on a simple branch or fork, the other fork often again forked.

1. ***P. australe***, Metten; Hook. *Spec. Filic.* iv. 167, *Syn. Filic.* 322.—Fronds entire, coriaceous, glabrous, linear or oblanceolate, usually 3 or 4 in. long but on high mountains reduced to about ½ in., or when very luxuriant above 6 in., obtuse, contracted into a short stipes. Veins, diverging from the midrib, once or twice forked, free, but con-

coaled in the thick substance of the frond. Sori oblong or linear almost as in *Grammitis*, rather large, oblique and parallel in a single row on each side of the midrib, and when old often confluent covering nearly the whole surface.—F. Mueh. Fragm. v. 127; *Grammitis australis*, R. Br. Prod. 146; Hook. f. Fl. Tasm. ii. 151; Sieb. Fl. Mixt. n. 235; *G. Bullardieri*, Willd. Spec. v. 139; *Polypodium diminutum*, Bak. Syn. Fil. 507.

**Queensland.** Mount Lindsay, *W. Hill*; Maroochie River, *Bailey*.

**N. S. Wales.** Port Jackson, *R. Brown*, *A. Cunningham*; New England, *C. Stuart*; Mountains on Bellinger River at an elevation of 5000 ft., *C. Moore*; Tweed River, *Guilfoyle*; Macleay River, *Fitzgerald*; Illawarra, *Johnson*; Lord Howe's Island, *C. Moore*, *Fullagar*.

**Victoria.** Mount Juliet, *S. L. Jones*; Dandenong Ranges, Apollo Bay, Mount Baw-Baw, etc., *F. Mueller*; Cape Howe, *Walter*.

**Tasmania.** Derwent River, *R. Brown*; abundant on damp rocks and trunks of trees throughout the island, ascending to 4500 ft., *J. D. Hooker*.

Also in New Zealand and the extreme south of America.

**2. *P. Hookeri*, Brackenr. ; Hook. Spec. Filic. iv. 171, Syn. Filic. 319.**—Fronds entire linear or lanceolate as in *P. australe* and sometimes as small, but often 6 to 8 in. long, and not quite so coriaceous, tapering into a very short stipes and always fringed and sprinkled with long spreading dark hairs. Veins rather more divided than in *P. australe*. Sori orbicular oval or shortly oblong, rather large, in a single row on each side of the midrib.—*P. setigerum*, Hook. and Arn. Bot. Beech. 103, t. 21, but scarcely of Blume.

**Queensland.** Rockingham Bay, *Dallachy*.

**N. S. Wales.** Lord Howe's Island, *C. Moore*, *Fitzgerald*.

Also in the Philippines and the Sandwich Islands. It is very closely allied to the true *P. setigerum*, Blume (*Grammitis fasciculata*, Blume, Fl. Jav. Filic. t. 47. f. 2; Hook. Ic. Pl. t. 941), but that has always the frond more abruptly contracted into a much longer stipes which gives it a different facies.

**3. *P. blechnoides*, Hook. Spec. Filic. iv. 180, Syn. Filic. 331.**—Fronds 2 to 4 in. long, coriaceous, deeply pinnatifid. Segments lanceolate almost reaching the rachis, but dilated and shortly confluent at the base, the larger ones in the middle of the frond 3 to 5 lines long, the lower ones shorter and broader, contracted into a short narrowly winged stipes. Veins pinnate in each lobe. Sori at the end of the veinlets, orbicular, 3 to 5 pairs in each lobe, forming 2 rows nearer to the margin than to the midrib.—*Grammitis blechnoides*, Grev. in Ann. Nat. Hist. ser. 2, i. 328, t. 17; *Polypodium contiguum*, Brackenr.; F. Muell. Fragm. v. 127.

**Queensland.** Rockingham Bay, *Dallachy*.

Also in the Pacific Islands.



4. **P. grammitidis**, *R. Br. Prod.* 147.—Fronds mostly 4 to 8 in. high, coriaceous, once or twice pinnatifid. Primary segments linear or narrow-lanceolate, reaching almost to the rhachis but more or less decurrent and confluent, the longer ones in the middle of the frond 1 to  $1\frac{1}{2}$  in. long, pinnatifid with the lobes mostly very short and obtuse but occasionally some of them linear and 3 to 4 lines long, the lower primary segments often shortly linear and entire, the lowest decurrent on the stipes, rarely almost all the segments linear and entire. Veins pinnate in the linear segments, almost simple in the short lobes. Sori orbicular or oval, varying from 1 to 4 according to the length of the lobe.—Hook. *Spec. Filic.* iv. 230, *Syn. Filic.* 327; Hook. f. *Fl. Tasm.* ii. 150; *Grammitis heterophylla*, Labill. *Pl. Nov. Holl.* ii. 90, t. 239; *Xiphopteris heterophylla*, Spreng. *Syst.* iv. 44.

**Victoria.** Fern-tree Gullies, Dandenong Range, *F. Mueller*.

**Tasmania.** Derwent River, *R. Brown*: abundant on alpine rocks forming matted patches, *J. D. Hooker*.

Also in New Zealand.

5. **P. tenellum**, *Forst.*; *Hook. Spec. Filic.* iv. 217, *Syn. Filic.* 337.—Fronds usually 1 to 2 ft. long, glabrous, simply pinnate, the stipes articulate on the rhizome. Pinnæ shortly petiolate and articulate on the rhachis, lanceolate, acuminate, often falcate, undulate-crenate, unequal at the base, 2 to 4 in. long, membranous. Veins pinnate with forked branches, one fork bearing the sorus, the other again forked. Sori orbicular, small, not very close, forming a row very near the margin as in the section *Nephrolepis* of *Aspidium*.—*R. Br. Prod.* 147; *Arthropteris tenella*, *J. Sm.* in Hook. f. *Fl. N. Zel.* t. 82.

**Queensland.** Brisbane River, Moreton Bay, *F. Mueller*, *A. Cunningham* and others; Mount Dryander, *Fitzalan*.

**N. S. Wales.** Grose River, *R. Brown*; Blue Mountains, *Mrs. Calvert*; New England, *C. Stuart*; Clarence, Macleay, Hastings and Richmond Rivers, *Beckler*, *Fawcett*, *Henderson* and others; Illawarra, *A. Cunningham* and others; Lord Howe's Island, *McGillivray*, *Milne*, *C. Moore*.

Also in New Zealand, Norfolk Island and New Caledonia.

6. **P. punctatum**, *Thunb. Fl. Jap.* 337.—Fronds 1 to 4 ft. long on a stipes of 1 ft. or more, broad in outline, twice or thrice pinnate as in the section *Lastrea* of *Aspidium*. Pinnules oblong,  $\frac{1}{2}$  to  $1\frac{1}{2}$  in. long, membranous or rather rigid when in full fruit, deeply pinnatifid with dentate segments. Veins in each pinnule or segment pinnate with free forked branches. Sori orbicular, in 2 rows on the smaller pinnules or longer lobes.—Hook. and Bak. *Syn. Filic.* 312; *P. rugosulum*, Labill. *Pl. Nov. Holl.* ii. 92, t. 241; *R. Br. Prod.* 147; Sieb. *Syn. Filic.* n. 109; *F. Muell. Fragm.* v. 129; *P. rugulosum*, Hook. *Spec. Filic.* iv. 272; Hook. f. *Fl. Tasm.* ii. 149; Bedd. *Ferns S. India*, t. 170.



**Queensland.** Rockingham Bay, *Dallachy*; Daintree River, *Fitzalan*; Brisbane River, Moreton Bay, *F. Mueller*; South Queensland, *Hartmann*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *A. Cunningham* and others; New England, *C. Stuart*; Richmond and Clarence Rivers, *W. Hill* and others; Illawarra, *Johnson*; Lord Howe's Island, *Fullagar*.

**Victoria.** Grampians, Dandenong Ranges, Bunip Creek, Upper Loddon River, etc., *F. Mueller* and others.

**Tasmania.** King's Island, *R. Brown*; abundant in damp and rather dry woods, *J. D. Hooker*.

Extends over the tropical and southern extratropical regions of the Old World, reaching northwards to Japan. It requires some care to distinguish the specimens from those of *Hypolepis tenuifolia* especially when the fructification is old, but the position of the sori on a nerve at some distance from the margin is very different from that of *Hypolepis*, where it is strictly marginal with the recurved indusium very distinct when young.

**SERIES II. SYNNEURA.**—Veins pinnate under each lobe of the pinnae, the branches simple, uniting with corresponding branches of the vein of the adjoining lobe. Sori usually placed towards the end of the upper branches of the series.

**7. P. proliferum**, *Presl*; *Hook. Spec. Filic.* v. 13, *Syn. Filic.* 315.—Fronds usually weak and spreading and often proliferous at the end, 1 to 2 ft. long when full grown, but some in full fruit much smaller, pinnate. Pinnae lanceolate, 1 to 4 in. long in Australian specimens, shortly and regularly pinnatifid with obtuse rounded lobes sometimes almost reduced to crenatures, broadly truncate at the base. Veins pinnate to each lobe, the branches or veinlets of adjoining lobes uniting in a vein leading to the sinus as in the section *Nephrodium* of *Aspidium*. Sori in 2 rows to each lobe, sometimes only at the end sometimes reaching almost to the midrib of the pinnae.—*F. Muell. Fragm.* v. 128; *Meniscium proliferum*, *Hook. 2nd Cent. Ferns*, t. 15; *Goniopteris prolifera*, *Presl*; *Bail. Queensl. Ferns*, 40.

**N. Australia.** Albert River, *Landsborough*.

**Queensland.** Mount Mueller, Rockingham Bay, *Dallachy*; Mount Elliott and Port Denison, *Fitzalan*; Palmer River, *Hahn's Expedition*; Rockhampton *O'Shanesby*; Brisbane River, *W. Hill*.

**N. S. Wales.** Clarence River, *Herb. F. Mueller*.

Dispersed over tropical Asia and Africa and in New Caledonia.

**8. P. urophyllum**, *Wall.*; *Hook. Spec. Filic.* v. 9, *Syn. Filic.* 314.—Fronds 2 to 4 ft. long on a stipes often nearly as long, pinnate, more or less glandular-pubescent underneath. Pinnae 6 in. to nearly 1 ft. long, 1 to 2 in. broad, acuminate, regularly and broadly crenate or shortly lobed, rounded or truncate at the base. Primary veins leading to the lobes numerous and parallel, pinnate, the branches or venules uniting in an intermediate vein leading to the sinus. Sori orbicular in 2 regular rows between each 2 primary veins, extending from the mid-

rib of the pinnae to the margin.—*Goniopteris urophylla*, Presl; Bail. Queensl. Ferns, 39; *G. lineata*, Bedd. Ferns Brit. Ind. t. 3; *Meniscium* or *Polypodium Kennedyi*, F. Muell. Fragm. iv. 165; *Goniopteris Kennedyi*, F. Muell.; Bail. Queensl. Ferns, 41.

**Queensland.** Rockingham Bay, *W. Hill, Dalley*; Daintree River, *Fitzalan*; York Peninsula, *N. Taylor*.

Spread over tropical Asia and the Pacific Islands. The figure of *Meniscium cuspidatum*, Blume, Fl. Jav. Filic. t. 45, quoted for this species is a good representation of the form and venation, but with very differently shaped sori.

9. ***P. Hillii*, Bak. Syn. Filic. 505.**—Frond in the specimen seen 1½ ft. high including the stipes, pinnate, densely and softly hirsute all over. Pinnae 9, the 3 terminal ones (exceptionally) small, the others oblong, 4 to 6 in. long, 1½ to 2 in. broad, pinnately crenate or shortly lobed but less regularly so than in the preceding species. Parallel primary pinnate veins leading to the lobes, the branches or venules uniting in an intermediate vein reaching the sinus. Sori as in *P. urophyllum*, in 2 rows between each 2 primary veins, reaching from the midrib to the margin but not close.—*Goniopteris Ghiesbreghtii*, Bail. Queensl. Ferns, 40, not of *Linden*.

**Queensland.** Between Cleveland and Rockingham Bay, *W. Hill*.

10. ***P. pæcilophlebium*, Hook. Spec. Filic. v. 14, Syn. Filic. 314.**—Fronds usually about 1 ft. long on a stipes at least half as long, pinnate, glabrous. Pinnae lanceolate, acuminate, 4 to 8 in. long, 1 to 1½ in. broad, shortly contracted into a petiole. Primary parallel veins numerous and prominent, pinnate, the branches or veinlets oblique, more or less anastomosing with those of the adjoining primary vein, but not forming a straight intermediate vein as in the preceding species. Sori rather small, in two irregular rows between each 2 primary veins.—*Goniopteris pæcilophlebia*, Bail. Queensl. Ferns, 40.

**Queensland.** Endeavour River and Fitzroy Island, *A. Cunningham*; Dunk Island, *McGillivray*; Rockingham Bay, *W. Hill, Dalley*; Mount Elliott, Daintree River and Port Denison, *Fitzalan*; York Peninsula, *N. Taylor*.

**SERIES III. DICTYOPHLEBIA.**—Venation reticulate. Primary veins proceeding from the midrib more or less distinctly parallel, connected by transverse anastomosing veinlets enclosing areoles in some of which are short free usually clavate veinlets. Sori placed either on the free veinlets or on the connecting branches.

In the coriaceous species the venation is generally concealed and the free veinlets difficult to observe, in some others they are only in a very few of the areoles but I have always found them in all the Australian species of the series. The position of the sori at the end of a free veinlet or in the middle of a connecting one is not constant in the same species or in the same frond, but in the whole genus they are never on the primary veins.

11. *P. serpens*, Forst. ; Hook. and Bak. Syn. Filic. 349.—Fronds small but growing in large matted patches, entire, coriaceous, obtuse, contracted into a short or rather long stipes, densely covered on the lower surface and more loosely on the upper one with stellate hairs or scales, the barren ones obovate or oblong, from under  $\frac{1}{2}$  in. to  $1\frac{1}{2}$  in. long, the fertile ones linear or oblong-linear,  $\frac{3}{4}$  to 1 in. long. Venation reticulate, concealed in the thick texture of the frond, and the dry frond even rugose with indented lines not connected with the veins. Sori irregularly crowded in the upper end or nearly over the whole frond, often confluent when old.—Sieb. Syn. Filic. n. 95 ; F. Muell. Fragm. v. 129 ; *P. rupestre*, R. Br. Prod. 146 ; Hook. Spec. Filic. v. 46 ; *Niphobolus rupestris*, Kaulf. ; Hook. and Grex. Ic. Filic. t. 93 ; *Polypodium confluens*, Hook. Spec. Filic. v. 46, Syn. Filic. 349, not of R. Br. ; *Niphobolus confluens*, Bail. Queensl. Ferns, 43.

Queensland. Edgecombe and Rockingham Bay, *Dallach* ; Mount Elliott, *Fitzalan* ; Brisbane River, Moreton Bay, *A. Cunningham*, *F. Mueller* and others ; Rockhampton, *Theozet*.

N. S. Wales. Port Jackson to the Blue Mountains, *R. Brown*, *Woolfs* and others ; New England, *C. Stuart* ; Hastings River, *Fraser* ; Clarence River, *Bekker*, *Widens* ; Tweed River, *Gillig* ; Illawarra, *Johnson* ; Twofold Bay, *L. Morton*.

Victoria. Cabbage-tree and Breadribb Rivers, *F. Mueller* ; Cape Howe, *Walter*.

Also in New Zealand and the South Pacific Islands.

12. *P. confluens*, R. Br. Prod. 146.—Fronds entire, coriaceous, obtuse or rarely acuminate, contracted into the stipes, covered with stellate hairs or scales usually very small and often deciduous making the fronds appear glabrous, but sometimes almost as abundant as in *P. serpens*, the barren ones oblong or obovate-oblong, 1 to 2 in. long, the fertile ones linear or lanceolate varying from 3 or 4 in. to nearly 1 ft. long. Veins reticulate but concealed in the texture as in *P. serpens*. Sori large, oval or oblong, in a single row on each side of the midrib, often confluent when old.—*P. glabrum*, Metten. Polypod. 123, Hook. and Bak. Syn. Filic. 356 ; *P. acrostichoides*, Sieb. Syn. Filic. 94, not of Forst.

Queensland. Burnett River, *F. Mueller* ; Brisbane River, Moreton Bay, *A. Cunningham*, *F. Mueller* ; Rockhampton, *Bowman*, *O'Shanesy*, *Theozet*.

N. S. Wales. Hunter's and Paterson's Rivers, *R. Brown* ; New England, *C. Stuart* ; Hastings, Macleay and Clarence Rivers, *Bekker* ; Lord Howe's Island, *C. Moore*, *Fullagar*.

Also in Norfolk Island and New Caledonia. Included by *F. Mueller*, Fragm. v. 129, in *P. serpens* and originally referred by Hooker and Baker to the nearly allied Asiatic *P. angustatum*, Sw. (*Niphobolus angustatus*, Hook. Gard. Ferns, t. 20).

13. *P. acrostichoides*, Forst. ; Hook. and Bak. Syn. Filic. 350.—Fronds lanceolate, entire or rarely forked at the apex, 6 in. to 2 ft.



long, contracted into a short stipes, coriaceous with the concealed reticulate venation of *P. serpens*, but the stellate hairs or scales on the under surface very minute and the upper surface usually glabrous. Sori in the upper part of the frond distinct but very small and exceedingly numerous crowded in several rows between the midrib and the margin.—R. Br. Prod. 146; *Niphobolus acrostichoides*, Bedd. Ferns Brit. Ind. t. 51; *N. puberulus*, Blume, Fl. Jav. Filic. 57, t. 23.

**Queensland.** Endeavour River, *Bracks and Schluter*; Cape York, *W. Hill, Daemel*; Cape York Peninsula, *N. Taylor*; Rockingham Bay, *W. Hill, Dallochy*; Fitzroy Island, *A. Cunningham, Walter*; Daintree River, *Finckh*.

Also in Ceylon, the Malayan Archipelago and the Pacific Islands.

14. ***P. attenuatum***, R. Br. Prod. 146.—Fronds entire, coriaceous, linear-lanceolate, obtuse or shortly acuminate, 6 to 18 in. long,  $\frac{1}{2}$  to  $\frac{1}{2}$  in. broad, contracted into a short stipes, glabrous, the reticulate venation concealed in the thick texture. Sori large, oval-oblong, inserted in cavities forming protuberances on the upper surface, rather distant in a single row on each side of the midrib about halfway between it and the margin.—Hook. Spec. Filic. v. 58, Gard. Ferns. t. 30; Sieb. Spec. Filic. n. 93, Fl. Mixt. n. 237; *Dictyopteris attenuata*, Presl; Bail. Queensl. Ferns, 41; *Polypodium Brownianum*, Spreng. Syst. v. 554 (Index); F. Muell. Fragm. v. 128; *P. Brownii*, Desv. in Ann. Soc. Linn. Par. vi. 227; Hook. and Bak. Syn. Filic. 355.

**Queensland.** Rockingham Bay, *Dallochy*; Mount Lindsay, *W. Hill*.

**N. S. Wales.** Port Jackson, *R. Brown, Fraser, A. Cunningham*; New England, *C. Stuart*; Newcastle, *Leichhardt*; Macleay, Clarence and Hastings Rivers, *Beckler*.

Brown's name was rejected on account of the *P. attenuatum* Humb. and Bonpl. published by Willdenow the same year (1810), but that species has been correctly referred by Grisebach to the *P. auriculatum*, Swartz, and the name *attenuatum* may therefore be retained for Brown's plant.

Also in the South Pacific Islands.

15. ***P. simplicissimum***, F. Muell. in Hook. and Bak. Syn. Filic. 513.—Fronds lanceolate, acuminate, entire or slightly crenate, 4 to 10 in. long, tapering into a short stipes, rather thin, glabrous, prominently penniveined with intermediate reticulations and free veinlets in the areoles. Sori rather large, orbicular, in a single row on each side of the midrib halfway between it and the margin, the receptacle scarcely excavated and obscurely or not at all prominent on the upper surface.—*P. lanceola*, F. Muell. Fragm. vii. 120; *Pleopeltis lanceola*, Bail. Queensl. Ferns, 45.

**Queensland.** Rockingham Bay, *Dallochy*. Very closely allied to *P. lanceola*, Mitten. in Ann. Sc. Nat. ser. 4, xv. 78, from New Caledonia to which F. Mueller refers it, but Kuhn who has compared it with the original specimen, writes that it

differs in the much thinner texture of the frond and in the narrow scales of the rhizome. The latter character is however very uncertain in *Polypodium*, where the scales always appear much narrower on vigorous ends of the rhizome than on older portions when the points have become much worn down.

16. **P. nigrescens**, *Blume, Fl. Jav. Filic.* 161, t. 70.--Fronds 2 or 3 ft. long on a stipes of 1 ft. or more, glabrous, deeply pinnatifid. Pinnæ lanceolate, acuminate with a narrow point, membranous, 6 in. to 1 ft. long, 1 to  $1\frac{1}{2}$  in. broad, confluent at the base in a broad wing to the rhachis, the main veins very distinct, reticulate between them with numerous free veinlets in the areoles. Sori large in the centre of the larger areoles, distant in a single row on each side of the midrib at some distance from it, the receptacles deeply excavated and very prominent on the upper surface.—*Hook. Spec. Filic.* v. 81, *Syn. Filic.* 364.

**Queensland.** Daintree River, *Fitzalan.*

Spread over East India, the Malayan Peninsula and Pacific Islands.

*P. membranifolium*, *R. Br. Prod.* 147. from Endeavour River, *Banks and Solander*, is most probably, from the short diagnosis and the station, the same as *P. nigrescens*, *Blume*, and if that were proved, *Brown's* name has the right of priority, but unfortunately the original specimen cannot now be found in the *Banksian* herbarium.

17. **P. phymatodes**, *Linn.; Hook. Spec. Filic.* v. 82, *Syn. Filic.* 364.—Fronds 1, 2 or even 3 ft. long, deeply pinnatifid, very smooth and glabrous. Pinnæ lanceolate, 4 to 8 in. long,  $\frac{3}{4}$  to  $1\frac{1}{2}$  in. broad, confluent at the base into a broadly winged rhachis, the midrib of each pinna very prominent, with copious reticulations between the primary veins but all concealed in the smooth though not thick texture of the frond. Sori rather large, orbicular or oval, distant in about two rows or rarely in a single row on each side of the midrib at some distance from it, the receptacles slightly excavated and prominent on the upper surface.—*Pleopeltis phymatodes*, *T. Moore; Bail. Queensl. Ferns*, 44; *Bedd. Ferns S. Ind.* t. 173.

**Queensland.** Cape York, *Daemel*; Rockingham Bay, *Dallachy*; Daintree River, *Fitzalan.*

Widely spread over the tropical regions of the Old World.

18. **P. pustulatum**, *Forst.; Carruth. in Seem. Fl. Vit.* 369, not of *Schkuhr*.—Near *P. phymatodes* but a smaller and more hardy plant. Fronds usually deeply pinnatifid,  $\frac{3}{4}$  to  $1\frac{1}{2}$  ft. high, with few segments but sometimes entire and 4 to 8 in. long. Segments oblong-lanceolate mostly acuminate, 3 to 6 in. long, 4 to 8 lines broad, confluent at the base into a broad-winged rhachis, of a firm membranous texture showing on the under side the primary veins with copious intermediate reticulations and free veinlets in the areoles. Sori orbicular, rather large, distant, in a single row on each side of the midrib at a distance

from it and often near the margin. Receptacles excavated, more or less prominent on the upper surface.—*P. scandens*, Labill. Pl. Nov. Holl. ii. 91, t. 240; F. Muell. Fragm. v. 128, not of Forst.; *P. Billardieri*, R. Br. Prod. 147; Hook. Spec. Filic. v. 82, Syn. Filic. 364; Sieb. Syn. Filic. n. 98; *P. diversifolium*, Willd.; Sieb. Fl. Mixt. n. 238; *Phymatodes Billardieri*, Presl; Hook. f. Fl. Tasm. ii. 150.

**N. S. Wales.** Port Jackson to the Blue Mountains, *R. Brown*, *Fraser*, *Wells*; Clarence River, *Wills*; Macleay River, *C. Moore*; Tweed River, *Gooden*; Illawarra and Two-fold Bay, *F. Mueller*; Lord Howe's Island, *McGillivray*, *C. Moore*, *Fullagar*.

**Victoria.** Grampians, *Wilkes*, *Sullivan*; Dandenong Ranges, Apollo Bay and Cape Howe, *F. Mueller*.

**Tasmania.** Port Dalrymple and Kent's Island, *R. Brown*; abundant on rocks and trunks of trees, *J. D. Hooker*; King's Island, *Neate*.

Also in New Zealand and perhaps in New Caledonia.

19. *P. scandens*, *Forst. Prod.* 81, not of *L. bill.*—Fronds much narrower in outline than in the preceding species, usually deeply pinnatifid and  $\frac{1}{2}$  to  $1\frac{1}{2}$  ft. long, but occasionally smaller and entire. Segments usually rather numerous, narrow lanceolate or almost linear, often falcate, obtuse or acuminate,  $1\frac{1}{2}$  to 3 in. long, decurrent and confluent into a winged rachis, of a thinner texture than the preceding species although the veins are but little prominent. Sori rather small, distant, in a single row on each side of the midrib between it and the margin, the excavated receptacles slightly prominent on the upper surface.—*P. pustulatum*, Schkuhr, Filic. ii. t. 10, Hook. Spec. Filic. v. 80, Syn. Filic. 363, Sieb. Syn. Filic. n. 96, not of Forst.; *Pleopeltis pustulata*, T. Moore; Bail. Queensl. Ferns, 45.

**Queensland.** Brisbane River, Moreton Bay, *A. Cunningham*.

**N. S. Wales.** Port Jackson to the Blue Mountains, *Wells* and others; New England, *C. Moore*; Hastings River, *A. Cunningham*, *B. Allen*; Macleay River, *Heriot*, *Fitzgerald*; Illawarra, *A. Cunningham*.

**Victoria.** Gillibrand River and Nangatta Mountains, *F. Mueller*.

Also in New Zealand and the South Pacific Islands.

20. *P. verrucosum*, *Wall.*; *Hook. Spec. Filic.* v. 31, *Gard. Ferns*, t. 41, *Syn. Filic.* 341.—Fronds 3 or 4 ft. long, pinnate, glabrous. Pinnæ oblong-lanceolate, acuminate, obtusely serrulate, equally or unequally cuneate at the base, shortly petiolate or almost sessile, apparently articulate on the rachis, 6 to 8 in. long,  $\frac{1}{2}$  to 1 in. broad, membranous. Venation reticulate between the primary veins with free venules in the areoles. Sori distant in a single row on each side of the midrib and near to it, the excavated receptacles very prominent on the upper surface -- *Goniophlebium verrucosum*, *Bedd. Ferns Brit. Ind.* t. 257.

**Queensland.** Reckingham Bay, *DeHobby*; Daintree River, *Fitzinger*.

Also in the Malayan Peninsula and Archipelago.



21. *P. subauriculatum*, Blume, *Fl. Jav. Filic.* 177, t. 83.—Fronds 1 to 3 ft. long, glabrous, pinnate. Pinnæ linear-lanceolate, mostly acuminate, entire or serrulate, 3 to 6 in. long, 3 to 5 lines broad, truncate rounded or auriculate at the base, nearly sessile but somewhat articulate on the rhachis. Venation reticulate between the primary veins, with free veinlets in the areoles. Sori distant in a single row on each side of the midrib and near to it, the excavated receptacles very prominent on the upper surface.—Hook. *Sp. Filic.* v. 32, *Syn. Filic.* 311; *Goniophlebium subauriculatum*, Presl; Bail. *Queensl. Ferns*, 42.

Queensland. Endeavour River, *A. Conchophorum*; York Peninsula, *N. Taylor*; Rockingham Bay, *Dallachy*; Daintree River, *Fitzalan*; near Rockhampton, *O'Shanesy*, *Thozet*.

Spreads over tropical Asia and the Pacific Islands.

22. *P. rigidulum*, Swartz; Hook. and Bak. *Syn. Filic.* 363.—Fronds of 2 kinds. Fertile ones 2 to 4 ft. long, pinnate, glabrous or the rhachis slightly pubescent. Pinnæ narrow-lanceolate, usually rigid and very prominently and copiously reticulate, 3 to 9 in. long, 3 to 9 lines broad, obliquely or equally cuneate at the base, often shortly petiolate, articulate on the rhachis. Sori orbicular, distant in a single row on each side of the midrib and not far from it, the excavated receptacles prominent on the upper surface. Barren fronds sessile on the rhizome, ovate or oblong, 6 in. to 1 ft. long, 3 or 4 in. broad, shortly pinnatifid rigid and very prominently veined; the lower pinnæ of the fertile fronds are also occasionally barren and a little altered in shape or texture. —*P. diversifolium*, R. Br. *Prod.* 147; Hook. *Spec. Filic.* v. 93, *Gard. Ferns*, t. 5; F. Muell. *Fragm.* v. 127; *Drynaria diversifolia*, J. Sm.; Bail. *Queensl. Ferns*, 46; *Polypodium Gaudichaudii*, Blume, *Fl. Jav. Filic.* t. 67.

Queensland. Sandy Cape, Harvey Bay, *R. Brown*; Port Bowen, *A. Conchophorum*; Port Denison and Mount Elliott, *Fitzalan*; Rockingham Bay, *W. Hill*, *Dallachy*; Rockhampton, *Bowman*, *Dallachy*, *O'Shanesy*; Fitzroy Island, *Walter*; Brisbane River, Moreton Bay, *Fraser*, *W. Hill*, *F. Mueller*.

N. S. Wales. Blue Mountains, *Mrs. Calvert*.

Also in the Malayan Archipelago and Pacific Islands. The great difference between the barren and fertile fronds in this and in *P. quercifolia*, upon which the genus *Drynaria* was founded appears to be a character of little real importance, as there are other cases where dissimilar and similar barren and fertile fronds occur in species otherwise very nearly allied.

23. *P. irioides*, Poir.; Hook. *Sp. Filic.* v. 67, *Syn. Filic.* 360.—Fronds entire, 1 to 3 ft. long, 1 to 3 in. broad, coriaceous, contracted into a very short stipes. Primary parallel veins distant and usually conspicuous, with copious fine reticulations between them, the free veinlets in the areoles numerous. Sori very small and numerous, covering the whole under surface of the upper part of the frond but quite distinct from each other.—Hook. and Grev.  *Ic. Filic.* t. 125;

Blume, Fl. Jav. Filic. t. 77; *Pleopeltis irioides*, T. Moore; Bedd. Ferns S. Ind. t. 178.

**Queensland.** Shoalwater and Keppel Bays and Broad Sound, *R. Brown*; Cape York, *W. Hill*, *Gulliver*; Rockingham Bay, *Dallachy* (some of his specimens with rather larger sori); Rockhampton, *Bowman*, *Dallachy*, *O'Shaneey*; Moreton Bay, *F. Mueller*, *Bailey*.

Spreads over tropical and subtropical Asia and Africa and the Pacific Islands.

24. *P. quercifolium*, Linn.; Hook. Spec. Filic. v. 96, Syn. Filic. 367.—Fronds of two kinds. Fertile ones 2 to 3 ft. long, deeply pinnatifid; segments lanceolate, 6 to 9 in. long,  $\frac{3}{4}$  to  $1\frac{1}{2}$  in. broad, decurrent on the rachis and usually confluent into a broad wing but sometimes interrupted between the lower segments, thin but usually rigid, very prominently and copiously reticulate, but the free veinlets within the areoles small and rare. Sori small, scattered, few or numerous. Barren fronds sessile, short broad and shortly pinnatifid as in *P. rigidulum*.—*P. Linnæi*, Bory, Hook. and Bak. Syn. Filic. 368; Bedd. Ferns Brit. Ind. t. 315; *Drynaria quercifolia*, J. Sm.; Bedd. Ferns, S. Ind. t. 187; *D. Linnæi*, Bail. Queensl. Ferns, 46.

**N. Australia.** Coen River and islands of the Gulf of Carpentaria, *R. Brown*; Port Darwin, *Schultz*, n. 2, 17, 674; North Coast, *Gulliver*.

**Queensland.** Keppel Bay, *R. Brown*; Albany Island, *F. Mueller*; Cape York, *Daniel*; Endeavour River, *A. Cunningham*; York Peninsula, *N. Taylor*; Rockingham Bay, *Dallachy*; Rockhampton, *Bowman*; Fitzroy Island, *Walter*.

Spread over East India the Malayan Peninsula and Pacific Islands.

*P. aureum*, Linn.; Hook. Spec. Filic. v. 16. Syn. Filic. 347, a tropical American species unknown in the Old World, has been included by F. Mueller, Fragm. v. 128, on the authority of a specimen from Hastings River, *Beckler*; but there is probably here some mistake, the plant has been long in general cultivation in plant-houses. The species has deeply pinnatifid fronds not unlike the fertile ones of *P. quercifolium*, but less rigid and the venation is simply reticulate without singly free veinlets in the areoles, the sori in one or 2 irregular rows on each side of the midrib are inserted at the junction of 2 veinlets in the areoles, and the receptacles are not prominent on the upper surface as in *P. phymatodes* which it also resembles in some respects.

### 34. NOTHOLÆNA, R. Br.

Rhizome tufted. Fronds usually small, once twice or thrice pinnate with small lobed segments. Veinlets forked from a central nerve or from the base of the segment. Sori small at the ends of the veinlets, almost contiguous forming an apparently continuous line within the unaltered margin, which is however more or less curved over them in a young state.

A small genus ranging over the tropical and warmer temperate regions of the New and the Old World. Of the four Australian species, one is identical with a West Mediterranean one, another extends to New Zealand and New Caledonia, the two remaining ones appear to be endemic. The genus is closely allied to *Cheilan-*





*thus*, with which it is united by F. Mueller and some others, but the recurved margins of the fronds can scarcely be regarded as true indusia. Some modern purists have altered Brown's name to *Nothochlæna*, but the contraction of *chlæna* into *læna*, after the example of the Romans, has been too generally sanctioned by botanists in many other cases, such as *Diplolæna*, *Eriolæna*, *Microlæna*, etc., to be here rejected.

Fronds 1 to 3 in. high, with few membranous and glabrous undivided or 3-lobed pinnae . . . . . 1. *N. pumilio*.

Fronds lanceolate in outline, 3 to 10 in. high, once or twice pinnate with pinnatifid pinnae.

Pinnae densely covered underneath with more or less woolly scales . . . . . 2. *N. vellea*.

Pinnae densely covered underneath with bristly scales . . . . . 3. *N. distans*.

Fronds broadly deltoid in outline, under 6 in. high, twice or thrice pinnate, sprinkled with rigid bristle-like hairs . . . . . 4. *N. fragilis*.

1. *N. pumilio*, *R. Br. Prod.* 146.—Fronds tufted, 1 to 3 in. high, simply pinnate, with a filiform rhachis. Pinnae few, ovate or oblong, obtuse, 3 to 5 lines long, membranous, without scales, entire or the lower ones with a short lateral lobe on one or both sides, the upper ones confluent. Veins obliquely diverging from the midrib. Sori continuous round the margin except at the base, the margin of the frond at first turned over them, but afterwards flat and not altered in consistence.—F. Muell. *Fragm.* viii. 175; *N. paucijuga*, *Bak. Syn. Filic.* 515.

**N. Australia.** Port Darwin, *Schultz*, n. 62.

**Queensland.** Endeavour River, *Banks and Solander*, *N. Taylor*.

2. *N. vellea*, *R. Br. Prod.* 146.—Fronds tufted, mostly under 6 in. long but in a few specimens 9 or 10 in., oblong-lanceolate in outline, pinnate or bipinnate, the rhachis hirsute. Pinnae  $\frac{1}{2}$  to 1 in. long, deeply pinnatifid or pinnate, rather thick, green and hispid above, very densely woolly hirsute and often ferruginous underneath, the lobes or segments ovate or rounded, very obtuse. Sori at the ends of the forked veins forming an almost continuous narrow line round the margin.—*Acrostichum velleum*, *Ait.*; *A. lanuginosum*, *Desf. Fl. Atl.* ii. 400, t. 256; *Notholæna lanuginosa*, *Poir. Dict.-Suppl.* iv. 110; *Hook. Spec. Filic.* v. 119, *Syn. Filic.* 370; *N. Brownei*, *Desv. in Mem. Soc. Linn. Par.* vi. 220; *Gymnogramme Brownei*, *Kuhn in Bot. Zeit.* 1869, 458; *Notholæna lasiopteris*, *F. Muell. in Hook. Kew Journ.* v. 106; *Cheilanthes vellea*, *F. Muell. Fragn.* v. 123.

**N. Australia.** Arnhem S. Bay, *R. Brown*; Upper Victoria River and Sea Range, *F. Mueller*; Arnhem Land, *M'Kinlay*; Port Darwin, *Schultz*, n. 954.

**Queensland.** Cape York, *Dallachy*; Cleveland and Rockingham Bays, *W. Hill, Dallachy, Gulliver*; Gilbert River, *Daintree*; Suttor River, *Bowman*.

**N. S. Wales.** In the interior from the Lachlan and Darling to the Barrier Range, *Victorian Expedition* and many others.

**S. Australia.** Lake Torrens, *F. Mueller*; Gawler Range, *Sullivan*; Lake Eyre, *Andrews*; Macdonnell Range, *Giles*.

**W. Australia.** Fraser's Range, *Dempster*.



Also in the West Mediterranean region. The distinctions pointed out by Kuhn between the Mediterranean and Australian plant do not hold good in all the Australian specimens.

**3. *N. distans*, R. Br. Prodr. 146.**—Very closely allied to *N. vellea*, of the same stature and general habit and not always easy to distinguish from it. The outline of the frond generally narrower, the lobes of the pinnules smaller and the indumentum not so dense, assuming on the under surface the form of bristles with little or none of the woolly hairs of *N. vellea*. Sori the same.—Hook. Spec. Filic. v. 114, Ic. Pl. t. 980, Syn. Filic. 372; Kunze in Pl. Preiss. ii. 109; *Cheilanthes distans*, A. Braun; F. Muell. Fragm. v. 122.

**Queensland.** Percy Islands, *A. Cunningham*; Logan River, *Fraser*; Brisbane River, *F. Mueller*, and many other localities in South Queensland from various collectors.

**N. S. Wales.** Port Jackson, *R. Brown*, *A. Cunningham*, *Woolfs*; New England, *C. Stuart*; Lord Howe's Island, *Fullagar*.

**Victoria.** Snowy River, *F. Mueller*.

**S. Australia.** Spencer's Gulf, *R. Brown*; Loxly Ranges, *F. Mueller*; Gawler Range, *Giles*.

**W. Australia.** *Drummond*, n. 666; York District, *Preiss*, n. 1302.

Also in Norfolk Island, New Caledonia and New Zealand. It is referred by Mettenius, Filic. Hort. Lips. 51 to the S. African *Cheilanthes profusa*, Kunze.

**4. *N. fragilis*, Hook. Spec. Filic. v. 114, t. 287, Syn. Filic. 372.**—Rhizome horizontal, rather thick, scaly. Fronds broadly deltoid in outline, in some specimens 1 to 1½ in. long, on a slender stipes twice as long, in others 3 in. long and broad, with a firmer black stipes twice or thrice as long, pinnate with numerous small deeply pinnatifid pinnules, the ultimate lobes under 1 line long, each one bearing a sorus large in proportion. Partial rachis and under side of the lobes hispid with a few rigid hairs or bristles.—*Cheilanthes fragillima*, F. Muell. Fragm. v. 123.

**N. Australia.** Fitzmaurice River, *F. Mueller*; Port Darwin, *Schultz*, n. 110, 138, 211.

### 35. GRAMMITIS, Swartz.

(Gymnogramme, Desv.)

Rhizome short and tufted or creeping. Fronds pinnate or bipinnate, with forked and free or reticulate veins. Sori linear or oblong, without any indusium, on veins diverging from the midrib, scattered or crowded in a broad intramarginal line.

The genus is generally dispersed over the tropical and some temperate regions in both hemispheres, in the New and the Old World. Of the six Australian species, one is widely dispersed in the Old World without the tropics extending to the Andes of







America, another is known from New Zealand Chili and South West Europe, a third is only in the Malayan Archipelago and Pacific Islands, and three are endemic.

Fronds simply pinnate. Pinnæ thick, entire, scaly underneath, with free veins, the sori crowded in a broad marginal line or band.

Pinnæ broadly ovate. Line of sori not 1 line broad . . . 1. *G. Reynoldsii*.

Pinnæ ovate or oblong. Line of sori above 1 line broad . . . 2. *G. Muellieri*.

Fronds small, bipinnate, with lobed segments. Veins free.

Pinnæ covered underneath with scaly hairs . . . . . 3. *G. rutæfolia*.

Pinnæ glabrous thin and delicate . . . . . 4. *G. leptophylla*.

Fronds simply pinnate or pinnatifid with long lanceolate pinnæ or segments. Veins netted.

Pinnæ tapering at the base, quite distinct. Sori very irregular and unequal . . . . . 5. *G. pinnata*.

Segments connected by a winged rhachis. Sori long, mostly reaching the margin . . . . . 6. *G. ampla*.

(See also *Polypodium australe*, with small narrow coriaceous undivided fronds.)

1. *G. Reynoldsii*, *F. Muell.*—Rhizome unknown. Fronds in our specimens 3 to 6 in. long, simply pinnate. Pinnæ in distant pairs, broadly ovate or orbicular, obtuse, entire, about  $\frac{1}{2}$  in. long, thick and densely covered on both sides with hairlike scales. Sori buried under the scales, oblong or shortly linear, transverse and distinct but closely crowded near the margin, forming a continuous line about 1 line broad, *Notholæna Reynoldsii*, *F. Muell. Fragm. viii. 175*.

**Central Australia.** Near Mount Olga. *G. sp.* Evidently nearly allied to the following species.

2. *G. Muellieri*, *Hook. ; F. Muell. Fragm. v. 188*.—Rhizome scaly, shortly creeping. Fronds 6 in. to 1 ft. long, simply pinnate, the rhachis scaly. Pinnæ in distant pairs, ovate or oblong, obtuse, entire,  $\frac{1}{2}$  to 1 in long, thick, sprinkled above and densely covered underneath with ciliate scales. Sori nearly buried under the scales, very numerous, mostly short, transverse but crowded in an apparently continuous line round the margin usually about  $1\frac{1}{2}$  lines broad. A few short barren outer fronds often with only 3 pinnæ or a single cordate one.—*Gymnogramme Muellieri*, *Hook. Spec. Filic. v. 143, t. 295, Syn. Filic. 379*.

**Queensland.** Cleveland and Rockingham Bays, *W. Hill, Bowman, N. Taylor ; Gilbert River, Armit ; Rockhampton, Bowman, O'Shanesy, Thozet*.

3. *G. rutæfolia*, *R. Br. Prodr. 146*.—Fronds tufted, 3 to 6 in. long, pinnate. Pinnæ obliquely obovate or almost fan-shaped, 3 to 6 lines long and broad, toothed, lobed, or again somewhat pinnate, contracted into a short petiole, sprinkled above and more densely covered underneath as well as the rhachis with brown scaly hairs occasionally glandular. Veins forked and radiating. Sori linear, mostly about the

middle of the pinna, sometimes almost covering the surface.—F. Muell. *Fragm.* v. 137; *Gymnogramme rutæfolia*, Hook. *Spec. Filic.* v. 137, Ic. Pl. t. 935, *Filic. Exot.* t. 5; Hook. and Grev. *Ic. Filic.* t. 90; Kunze in *Pl. Preiss.* ii. 110; Hook. f. *Fl. Tasm.* ii. 151; *Gymnogramme Pozoi*, Kunze; Hook. and Bak. *Syn. Filic.* 379; *Gymnogramme subglandulosa*, Hook. and Grev. *Ic. Filic.* t. 91; *Gymnogramme papaverifolia*, Kunze; *Bail. Queensl. Ferns*, 34.

**Queensland.** Port Denison, *Fitzalan*; Dalrymple Creek, *Hortsm*; Spring-sure, *Wuth*; Maranoa River, *Mitchell*.

**N. S. Wales.** Port Jackson and Blue Mountains, *Wolls* and others; Liverpool Plains, *A. Cunningham*, *C. Moore*; New England, *C. Stuart*; Goyinga Mountains, *Victorian Expedition*.

**Victoria.** Melbourne, *Adams*, *Robertson*; Grampians, *Sullivan*; Broken and Goulburn Rivers, *F. Mueller*; Gipps' Land, *Walter*.

**Tasmania.** Derwent River. *R. Brown*, common in shaded dry stony places, *J. D. Hooker*.

**S. Australia.** Lofty Range, *F. Mueller*; Gawler Range, *Sullivan*; Central Australia, *Gosse*, *Giles*.

**W. Australia.** *Drummond*, n. 1000; York District, *Preis*, n. 1303; Stirling Range, *F. Mueller*; between Esperance Bay and Fraser's Range, *Dempster*.

Also in South Western Europe, Chili and New Zealand.

4. ***G. leptophylla***, Swartz, *Filic.* 218, t. 1, f. 6.—Fronds tufted, delicate, under 6 in. high and often only 2 in., the outer ones short, with few broadly obovate or fan-shaped segments often barren, the others erect with a slender black rhachis, twice pinnate; segments numerous, oblong or cuneate, 2 to 3 lines long, more or less deeply lobed, with usually a single oblong sorus on each lobe, often covering the whole surface.—F. Muell. *Fragm.* v. 137; *Gymnogramme leptophylla*, Desv.; Hook. *Spec. Filic.* v. 136, *Brit. Ferns*, t. 1, *Syn. Filic.* 383; Hook. and Grev. *Ic. Filic.* t. 25; Hook. f. *Fl. Tasm.* ii. 151; *Bedd. Ferns S. Ind.* t. 270.

**N. S. Wales.** Port Stephen, *King*.

**Victoria.** Yarra and Loddon Rivers and neighbourhood, *F. Mueller*, *Robertson* and others.

**Tasmania.** Spring Bay near the Tamar, *Gunn*.

**S. Australia.** Barossa Range, *Behr*.

**W. Australia.** *Drummond*, n. 360, 996.

Widely dispersed over the temperate and subtropical regions of the Old World, and also in the Andes of South America.

5. ***G. pinnata***, F. Muell. *Fragm.* vi. 124.—Rhizome shortly creeping. Fronds 1 to 2 ft. high, simply pinnate, glabrous. Pinnæ 3 to 11 or reduced to the single terminal one, lanceolate, 1 to 10 in. long,  $\frac{1}{2}$  to 1 in. broad, contracted at the base into a short petiole, entire, the prominent midrib and rhachis smooth and shining. Veins diverging from the midrib forked and anastomosing. Sori linear or narrow-oblong, very unequal and irregularly scattered.—*Gymnogramme pinnata*, Hook. *Spec. Filic.* v. 151, *Syn. Filic.* 390; *Hemionitis elongata*,







Brackenr. Filic. U. S. Expl. Exped. t. 8; *Dictyogramme pinnata*, T. Moore; Bail. Queensl. Ferns, 33.

**Queensland.** Rockingham Bay, *W. Hill, Dallachy*.

Also in the Malayan Archipelago and South Pacific Islands.

6. *G. ampla*, *F. Muell. Fragm.* v. 188.—Rhizome rather thick, scaly, creeping. Fronds 1 to 2 ft. high, deeply pinnatifid, glabrous. Segments 3 to 11, lanceolate, 3 to 6 in. long,  $\frac{3}{4}$  to  $1\frac{1}{4}$  in. broad when fertile, often 2 in. when barren, acuminate, membranous, entire, decurrent and connected by a broad wing to the rhachis, the wing gradually tapering below the lowest pair but continued almost to the base of the stipes. Veins proceeding from the midrib immediately forked, one branch bearing a straight linear sorus extending usually to the margin, the other prominent flexuose with anastomosing branches, and from both are emitted a few short free branches.

**Queensland.** Rockingham Bay, *Dallachy*; Daintree River, *Fitzalan*.

Included by Baker, *Syn. Filic.* 389-390 in the Asiatic *G. pinnatifida* (*Grammitis elliptica*, Bak. (*Polypodium*, Thunb.), but the further specimens in Herb. F. Mueller, have convinced him that it differs essentially in the thin membranous texture, the continuously winged rhachis and stipes, the longer sori, more prominent intermediate veins, etc.

### 36. ANTROPHYUM, Kaulf.

Rhizome creeping. Fronds simple, entire, lanceolate or broad, with longitudinal more or less anastomosing veins, bearing long linear sori without any indusium.

A small genus dispersed over the tropical regions of the New and the Old World. The only Australian species is Asiatic, extending to the Pacific Islands.

1. *A. reticulatum*, *Kaulf.*; *Hook. Spec. Filic.* v. 169; *Syn. Filic.* 393.—Rhizome hairy, creeping. Fronds 6 in. to 1 ft. long, 1 to  $1\frac{1}{2}$  in. or rarely nearly 2 in. broad, acuminate, tapering into a short stipes, glabrous, rather firm, the veins prominent on the upper surface forming long narrow areoles. Sori all longitudinal, narrow-linear but varying much in number and length.—*Bedd. Ferns S. Ind.* t. 52 and 231; *A. plantagineum*, *Kaulf.*; *Bail. Queensl. Ferns*, 33.

**Queensland.** Rockingham Bay, *W. Hill, Dallachy*; Bowen, *Woolfs*; Daintree River, *Fitzalan*.

*A. semicostatum*, *Blume, Fl. Jay. Filic.* 77, t. 33, to which *F. Mueller, Fragm.* v. 138, refers this plant, is a form or variety with a larger frond broader above the middle. The Australian specimens agree better with the typical *A. reticulatum* as figured by *Schkuhr, Syn. Filic.* t. 6.

## 37. ACROSTICHUM, Linn.

Rhizome creeping sometimes to a great length or short and erect. Fronds undivided or pinnate, variously veined. Sori confluent, covering the under surface of the fertile fronds or pinnae, which are usually smaller or narrower than the barren ones. No indusium.

A large genus, chiefly tropical, spread over both the New and the Old World. Of the seven Australian species three are common to the New and the Old World, three limited to the Old World and one only endemic.

- |  |                            |
|--|----------------------------|
| Fronds simple, lanceolate, with free veins, the fertile ones nearly similar                                  | 1. <i>A. conforme</i> .    |
| Fronds pinnate. Pinnae entire, the barren with numerous parallel free veins, the fertile very narrow-linear. |                            |
| Barren pinnae broadly lanceolate, rounded or cuneate at the base   | 2. <i>A. scandens</i> .    |
| Barren pinnae narrow-lanceolate, tapering to a petiole   | 3. <i>A. sorbifolium</i> . |
| Fronds pinnate. Veins reticulate.  |                            |
| Pinnae membranous, shortly and broadly pinnatifid, the fertile usually on different fronds                   | 4. <i>A. repandum</i> .    |
| Pinnae coriaceous, entire, the upper ones fertile on the same fronds   | 5. <i>A. aureum</i> .      |
| Fronds simple, narrow, with reticulate veins, contracted into a linear fertile apex                          | 6. <i>A. spicatum</i> .    |
| Fronds bipinnate, the fertile segments narrow-linear on different fronds from the barren                     | 7. <i>A. pteroides</i> .   |

1. *A. conforme*, Swartz; Hook. Spec. Filic. v. 198, Syn. Filic. 401.—Rhizome creeping, scaly. Fronds simple, lanceolate, coriaceous, from a few in. to above 1 ft. long,  $\frac{1}{2}$  to 1 in. broad, acute or acuminate, tapering into a stipes sometimes narrowly winged almost to the base; veins parallel, simple or forked, not close and concealed in the texture of the frond. Fertile fronds usually smaller and more obtuse.—F. Muell. Fragm. v. 138; *Elaphoglossum conforme*, Schott; Bail. Queensl. Ferns, 9.

Queensland. Rockingham Bay, Dallachy.

Widely spread over the tropical and southern extratropical regions of the New and the Old World.

2. *A. scandens*, J. Sm.; Hook. Spec. Filic. v. 219, Syn. Filic. 412.—Rhizome woody, scaleless, creeping in swamps or climbing on trees. Fronds 1 to 3 ft. long, simply pinnate. Pinnae of the barren fronds broadly lanceolate, acuminate, rounded or cuneate at the base and shortly petiolate, 3 to 8 in. long,  $\frac{1}{2}$  to 1 $\frac{1}{2}$  in. broad, entire or slightly dentate, coriaceous, smooth and shining. Veins very numerous fine and closely parallel. Pinnae of the fertile fronds long and very narrow-linear, sometimes almost terete, sometimes flat and 2 lines broad.—F. Muell. Fragm. vi. 124; *Stenochlæna scandens*, J. Sm.; Bail. Queensl. Ferns, 10.

N. Australia. Port Darwin, Schultz, n. 3, 215.

Queensland. Cape York, W. Hill; Rockingham Bay, W. Hill, Dallachy.

Also in Tropical Asia and the Pacific Islands.





3. **A. sorbifolium**, Linn.; Hook. *Spec. Filic.* v. 241, *Syn. Filic.* 412, *var. leptocarpum*.—Rhizome woody, often climbing trees to the height of 30 or 40 ft. Fronds pinnate, 1 to 2 ft. long. Pinnae of the barren fronds lanceolate acuminate, equally or obliquely tapering into a short petiole, 3 to 8 in. long, 4 to 8 lines broad, often denticulate, not very thick but smooth and shining. Veins numerous, parallel,  $\frac{3}{4}$  to 1 line apart. Pinnae of the barren fronds more numerous, almost filiform in the Australian specimens,  $\frac{1}{4}$  in. broad or rather more in some exotic forms. —*A. Brightiae*, F. Muell. *Fragm.* vii. 119; *Lomariopsis Brightiae*, F. Muell. in *Bail. Queensl. Ferns*, 10.

**Queensland.** Rockingham Bay, *Dallachy*.

Spread over the tropical regions of the New and the Old World. Exceedingly variable as to the breadth of the fertile pinnae, etc., and divided by Fée into seven or eight species of a genus *Lomariopsis*, amongst which his *L. leptocarpa* and some others are well represented among *Dallachy's* specimens.

4. **A. repandum**, Blume; Hook. *Spec. Filic.* v. 260, *Syn. Filic.* 419.—Rhizome creeping. Fronds 1 to 2 ft. long, pinnate, the rachis scaly. Pinnae of the barren fronds membranous, lanceolate, the lower ones obliquely truncate at the base and attached by the midrib, 3 to 5 in. long, under 1 in. broad in the Australian specimens, pinnatifid with broad lobes rarely reaching halfway to the midrib, the upper pinnae smaller more entire and confluent into a broad wing to the rachis. Veins copiously reticulate, with a central vein opposite each lobe. Pinnae of the fertile fronds much smaller and narrower, but usually more or less pinnately lobed or broadly crenate.—F. Muell. *Fragm.* v. 138.

**Queensland.** Rockingham Bay, *W. Hill, Dallachy*; Daintree River, *Fitzalan* (one of the specimens with a semi-fertile frond); Bowen, *Wells*; York Peninsula, *N. Taylor* (young plants of a few inches already in fruit).

Extends over the Malayan Archipelago to South China and the Pacific Islands.

5. **A. aureum**, Linn.; Hook. *Spec. Filic.* v. 266, *Syn. Filic.* 423.—Rhizome short, thick, erect. Fronds 2 to 6 ft. long, pinnate, glabrous, the rachis firm and smooth. Pinnae distant, the lower ones petiolate, the upper sometimes shortly decurrent, coriaceous, entire, oblong, from 3 to 4 in. long,  $\frac{3}{4}$  to 1 $\frac{1}{2}$  in. broad, the fertile ones rather smaller, few or many in the upper part of the same fronds as the barren ones. Veins oblique, very fine and numerous, copiously reticulate.—Bedd. *Ferns S. Ind.* t. 204; *A. foveatifolium*, R. Br. *Prod.* 145.

**N. Australia.** McAdam Range, *F. Mueller*; Port Essington, *Arndstrang*; Port Darwin, *Schultz*, n. 521.

**Queensland.** Port Bowen, *R. Brown, Wells*; Cape York, *W. Hill, Darnel*; York Peninsula, *N. Taylor*; Endeavour River, *A. Cunningham*; Rockingham Bay, *Dallachy*; Daintree River, *Fitzalan*; Brisbane River, *A. Cunningham, F. Mueller*.

**N. S. Wales.** Clarence River, *Wells*; Richmond River, *Hooker, Mrs. Hodgkinson*.



Widely spread over the tropical and subtropical regions of the New and the Old World. In Australia chiefly in swampy flats or salt water marshes.

**6. *A. spicatum*, Linn.; Hook. Spec. Filic. v. 280, Syn. Filic. 424.**—Rhizome thick, creeping. Fronds simple, 6 to 18 in. long, the lower barren part lanceolate or linear-lanceolate, 3 to 9 lines broad, contracted at the top into a fertile linear apex 1 to 1½ lines broad, of variable length. Veins in the barren part obliquely reticulate with a free veinlet within the areoles. Sori in the fertile part forming a broad continuous line on each side of the midrib with the free margin incurved over them when young but at length covering the under surface. Spore-cases often intermixed with peltate scales.—*Hymenolepis spicata*, Presl; Hook. Filic. Exot. t. 78, Gard. Ferns, t. 3; Bedd. Ferns S. Ind. t. 46.

**Queensland.** Brisbane River, Moreton Bay, *W. Hill*.

Spread over tropical Asia, extending to the Mascarene and to the Pacific Islands.

**7. *A. pteroides*, R. Br. Prod. 145.**—Rhizome shortly creeping. Fertile fronds ovate-lanceolate in circumscription, 3 to 6 in. long on a stipes at least as long, bipinnate. Segments linear, ¾ to 1½ in. long, scarcely 1 line broad. Sori on very numerous diverging veins, at a little distance from the midrib, so close together as to cover the whole frond except the midrib and a very narrow margin recurved over the young sori. Barren fronds, which I have not seen, "smaller than the fertile ones with linear-lanceolate segments, otherwise similar" (*Kuhn*).—Hook. Spec. Filic. v. 279; F. Muell. Fragm. v. 139; *Neurosoria pteroides*, Metten.; Kuhn in Bot. Zeit. 1869, 438.

**N. Australia.** North Coast, *R. Brown*; Port Darwin, *Schultz*, n. 137; Gilbert River, *Armit*.

**Queensland.** Endeavour River, *G. Brown*.

### 38. *PLATYCERIUM*, Desv.

Rhizome short and thick. Fronds large, the outer ones of each year's growth barren and horizontally spreading, the fertile ones erect cuneate forked or dichotomous, the veins prominent radiating and reticulate. Sori forming very large broad patches towards the end of the fronds.

A small genus, sparingly distributed over the Malayan Archipelago and tropical Africa and America. Neither of the Australian species are endemic.

Sori covering the ultimate lobes of the fertile fronds . . . 1. *P. alcicorne*.

Sori forming a large patch under the broad sinus of the primary division of the fertile fronds . . . 2. *P. grande*.

**1. *P. alcicorne*, Desv.; Hook. Spec. Filic. v. 282, Syn. Filic. 425.**—Barren fronds orbicular-cordate, cottony when young, 6 in. to 1 ft.







long and broad, rigid, the margin more or less sinuate or obtusely lobed. Fertile fronds attaining 2 to 3 ft., contracted into a distinct stipes, dilated upwards, once twice or thrice forked. Sori or patches of spore-cases occupying the whole or the greater part of the ultimate lobes.—*Acrostichum alcicorne*, Swartz; R. Br. Prod. 145; Bot. Reg. t. 262.

**Queensland.** Bellenden Ker Range, *W. Hill*; Moreton Bay, *F. Mueller*; Rockhampton, *Bowman*, *O'Shanesy*, *Thozet*; Springsure, *Wuth*.

**N. S. Wales.** Port Jackson, *R. Brown*, *Fraser* and many others; New England, *C. Stuart*; Hastings River, *Beckler*; Illawarra, *Johnstone*; Lord Howe's Island, *Fullagar*.

Also in the Mascarene Islands.

2. ***P. grande***, *J. Sm.*; *Hook. Spec. Filic.* v. 284, *Filic. Exot. t.* 86, *Syn. Filic.* 425.—A larger plant than *P. alcicorne*, often more membranous but the primary veins more prominent. Barren spreading fronds often more than 1 ft. diameter, the margin deeply and irregularly lobed. Fertile fronds from a broad rigid winged stipes expanding to a great breadth, dichotomously divided, but the first fork leaving a very broad truncate sinus under which the fructification forms a patch more than 6 in. diameter, in one specimen of *Dallachy's* 18 in. broad, the forks on each side often above 1 ft. long, deeply and dichotomously lobed but barren.—*Bedd. Ferns Brit. Ind.* t. 326.

**Queensland.** Rockingham Bay, *Dallachy*; Bowen, *Woolfs*; Warwick, *Nervist*; Brisbane River, Moreton Bay, *A. Cunningham*.

**N. S. Wales.** New England, *C. Stuart*; Clarence River, *Beckler*; Richmond River, *Mrs. Hodgkinson*.

Also in the Malayan Archipelago.

## ERRATA.

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p. 139, under *Kentia acuminata* :

For **W. Australia**, read **N. Australia**.

p. 192, under *Eriocaulon quinquangulare* :

For **W. Australia**, read **N. Australia**.

p. 302, under *Fimbristylis rhyticarya* :

For **W. Australia**, read **N. Australia**.

p. 370, under *Schoenus brevifolius*, add :

*S. globifer*, Nees in Pl. Preiss. ii, 81, from W. Australia, *Preiss*, n. 1797, which I have not seen, is, from the description, probably *S. brevifolius*, R. Br., which has frequently the villous globular mass terminating the rhachis of the spikelet mentioned under *S. brevisetis*, p. 361.

p. 372, under *Schoenus falcatus* :

For **W. Australia**, read **N. Australia**.

p. 567, under *Stipa flavescens* add :

*S. laeviculmis*, Nees in Pl. Preiss, ii, 99, founded on a specimen of uncertain origin, which I have not seen, is referred by J. D. Hooker to *S. flavescens*, with which however Nees's character does not quite agree.

# INDEX OF GENERA AND SPECIES.

*The synonyms and species incidentally mentioned are printed in italics.*

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